AMERICAN GAS ASSOCIATION MONTHLY

Vol. III No. 2

February, 1921

"One Bee by working alone
can make no honey . . . ."

—*Maeterlinck's Life of the Bee*

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FOR STATEMENTS AND OPINIONS CONTAINED IN PAPERS AND DISCUSSIONS APPEARING HEREIN, THE ASSOCIATION DOES NOT HOLD ITSELF RESPONSIBLE

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Vol. III FEBRUARY, 1921 No. 2

The Hive

No good American is willing to participate in an unfair game, for the good American knows that its only the fair game that builds a nation. We all play in the same land; we all work in the same land. We are builders of America, and if there is one among us who feels that his service is indispensable let him look to the years that have gone before. Let him look to those other builders, the fathers of this America. No one man, no one group of men, nor no one craft has developed this new land. It has come to maturity only through the combined efforts of all men and of all their crafts, the collective work and the collective play of all. Those builders—who have they been, and from where have they come? From every walk of life and from all nations, teachers, engineers, inventors, artists, and business men have established this group of states and made, in something over a century, the richest, the freest, the happiest nation of people on the face of the earth. And what has been Industry's part?

Steel—for the paths the engineer has pushed through the wilderness, for the ships that have bridged the waters; coal—for giant furnaces that have kept the pulse of the nation throbbing—and so down the list of all raw materials, harvested and mined; all manufactured products, to the business of buying and selling, and the organization of our foreign trade. Construction miracles have been performed and to-day we have the highest cities in the world, and the most efficient transportation of everything from produce to the human voice.

Consider the railroads—how in the past the entire country has been affected by their prosperity. Consider steel, and what it would mean to the nation if its production were suspended for even a brief time. We know too well what the coal strike has meant. Electricity is another spoke in the wheel.

Were the service of our industry to cease the resultant havoc would be inconceivable. From the inconvenience which the gas range owner would experience (and there are thousands whose cooking depends upon the gas range), it would extend to the fuel ovens of the big industrial plants, to the smallest accounts in the savings banks, and indirectly, to every corner of the country.

The Public Utility is the fulfilment of a public need; it is the last word in community organization. Business and pleasures are so interdependent in the modern scheme of things that we are nothing more than a Hive and as such no one individual or group can survive apart from his fellows. In these months approaching the return to a normal state remember that the work we have started in this period of stress must be carried on. Let the industry complete its "good-will" campaign, let it follow the teachings of its new creed, and it will be safe for all time regardless of weather.

AMERICAN GAS ASSOCIATION MONTHLY

Vol. III FEBRUARY, 1921 No 2

Testimony Before Pennsylvania Commission at Hearing on Reducing B. t. u. Standard*

The necessity for lower B. t. u. standards in order to conserve oil and permit the economical operation of gas-making equipment with materials of the quality now obtainable, as well as the effect of such standards on the service to the consumer, was brought out in the sworn statements of a number of the leading authorities on this subject before the Pennsylvania Public Service Commission on November 23, 1920. Following the hearing, the Commission so modified its requirements as to permit a reduction in the average heating value from 570 B. t. u. to 520 B. t. u.

Certain of the testimony is particularly valuable as supplementing the information already furnished our members, and should prove helpful in other cases where effort is being made to establish a reasonable heating value standard.

In re: Petition of the Pennsylvania Gas Association for revision of heating value standard of artificial gas as presently prescribed by Commission regulations.

J. B. KLUMPP, Chairman of the Calorific Standards Committee of the American Gas Association, called on behalf of the petitioners, was duly sworn. An extract from his testimony is as follows:

MR. GILMOUR: As chairman of the Gas Oil Committee, what investigation have you made as to the gas oil condition in the country, especially in reference to the eastern states?

MR. KLUMPP: With the inability of gas companies to get gas oil last fall, the Gas Association requested our committee to make a particular study of this situation, both as to the production, the supply and the demand for oils, and particularly with relation to the gas oil supply for gas companies throughout the

*The following is an abstract and does not include a complete record of the testimony.

country. In this connection we had a number of conferences with the oil men, bringing in many of our gas men, who were having difficulty in getting gas oil. Our conferences have led us to believe that all oil which can be used for gas making purposes is suitable for use in making gasoline and that the introduction of the pressure and vacuum improvements in refining have permitted the oil companies to break down our gas oils to gasolines. As soon as discovered and put into operation there began a depletion of the gas oil supply. As early as the fall of 1919 the supply of gas oil began to reach a critical stage, to such an extent that many of our associated gas companies were not able to get a sufficient quantity, and those that were getting gas oil were getting such a poor quality that they were unable to produce the gas qualities that we are accustomed to.

Our investigation showed that the gas companies in the United States were using about 26,000,000 barrels of gas oil a year. We originally got that as a by-product of the refineries and we were able to buy it at prices relatively low—three, four and five cents. But as soon as the quantity used for gasoline manufacture grew, the quantity of gas oil available to us decreased very rapidly, to such an extent that many of our companies were told that they could not get gas oils, and ever since that time we have not been able to contract for gas oil in any quantity for any length of time and have been compelled to take it in small lots and buy spot oil.

Most of the oils that we receive have been very heavy in gravity and contain such a large carbon content that we have not been able to handle the same quantities in our gas machines with any degree of efficiency. In fact, many of our plants this past spring and winter have practically been compelled to shut down temporarily until the machines were overhauled. It has gotten to such a point now that we are compelled to reduce our activities and take anything that we can get for gas making purposes.

MR. GILMOUR: Now, I understood you to say that some years ago the gas oil you referred to was a by-product of the refining of crude oil.

MR. KLUMPP: Yes, that is true.

MR. GILMOUR: I think you did not explain with sufficient clearness the change that had taken place and why that by-product is useful in other directions at the present time.

MR. KLUMPP: Well, as our crude oils are distilled, first the gasolines come off, and then the kerosenes, and then the gas oils and lubricating oils and lastly the pitch. The demands for gasoline in the early days and kerosene were such that the distillation process yielded all of the gasoline needed, and the gas companies were able to buy gas oil or fuel oil as a by-product. It was something that oil refiners could not easily get rid of. It was used for gas making purposes, and that is the reason that 70 per cent. of the gas made in the United States to-day is carburetted water gas. If it had not been available, these installations would not have been put in.

When the demand for gasoline became so great, the scientific men in the oil industry put forth every effort to increase the supply, and they found by experiment that by distilling under pressure—high pressures and temperatures—they could break down the gas oils into gasoline and a lower product. In other words, any oil

that could be gasified could be broken down into gasoline and carbon, you might say.

MR. GILMOUR: In other words, the original process for the manufacture of gasoline was by distillation from crude oil?

MR. KLUMPP: Distillation alone.

MR. GILMOUR: And then, when the demand for gasoline increased, a method of producing gasoline from what had formerly been a gas oil—a by-product—was discovered and that gas oil became immediately more valuable for that reason?

MR. KLUMPP: It became valuable because the scientific development of refineries enabled them to get practically half a gallon of gasoline from one gallon of gas oil. Now, the figures last year showed that 15 per cent. of the total gasoline used was obtained from breaking down gas oil.

This year, 1920, 18 per cent. of the gasoline produced is obtained from breaking down gas oil, and with the enormous increase of automobiles and the demand for gasoline, the price of gasoline has gone up to figures around 35 cents and thereabouts retail, which made the price of gas oil, as one of the oil companies recently told me, 45 per cent. of the value of gasoline. So, we can always look upon gas oil in the future to be worth that much in the competitive market.

MR. GILMOUR: In competition with gasoline?

MR. KLUMPP: In competition with gasoline .

* * *

MR. KLUMPP: . . . Just at present there is a softening of the (gas oil) market, because the gasoline consumption is falling off. But our investigations have shown that it is only temporary and that next summer and fall it is going to be where it was, and we don't know whether we will get any gas oil at all two or three years from now.

The big increase in oil production, as records of the Government show, has been due to the importation of Mexican oils. The Mexican oils are not suitable for gas making purposes, because after they have topped the gasoline off by ordinary distillation they cannot be put through this cracking process. The oil is so heavy in gravity that, if they attempt to break that down, the residue comes off as a solid instead of a liquid, so we can look for no relief from the Mexican oil situation.

CHAIRMAN AINEY: What is the nature of that residue—that solid?

MR. KLUMPP: Why, it is practically asphalt. It might be used for street paving or road building, but if they carried distillation of Mexican oils any further than they do now they could not remove the residue from the still. It is a solid. The lighter Mexican oils have so much sulphur that we haven't been able to purify properly where we have been using them for city gas.

* * *

MR. GILMOUR: Has the development of heating appliances made other standards more desirable than the candlepower standard?

MR. KLUMPP: Our investigation, covering, you might say, 16 years, and continuing to-day, has shown us in the gas business that probably from 85 per cent. to 95 per cent., in some cases probably nearly 100 per cent. of all the gas used, is dependent upon its heating value. The illuminating value is of no value whatever, except when it is burned in the

open-flame burner, which is practically extinct in a great many cities. The heating value is the essential factor for Welsbach lighting, for cooking, for water heating, and for industrial use, and it was on account of that fact that the commissions very generally have recognized the heating value standard and adopted it throughout this country, England and Germany.

* * *

MR. KLUMPP: . . . Now, with regard to the heating value standard, we have recognized that our best grades of gas oil are being taken from us; our best grades of gas coal are not available as they were, and it is practically impossible for the gas companies to live up to the standards prescribed in the original prescriptions of a number of the Commissions, and recognizing this fact, at least six or seven of the Commissions have already reduced their standards, notably Massachusetts, Connecticut, Michigan, Wisconsin, New Hampshire, New Jersey, Washington State and probably some others—there are some others pending—as the only relief that will enable the gas companies to maintain continuity of service under the present conditions of supply of materials, and a very notable instance is the Dominion of Canada. After trying this matter out during the war, they adopted a 450 heat unit standard.

MR. GILMOUR: I think theirs is the same standard as in England?

MR. KLUMPP: The English standard is 450, also.

(Under the "Gas Regulation Act, 1920," recently passed, English gas companies now operate on a flexible standard.)

MR. GILMOUR: What led the Wisconsin Commission, if you know, to adopt the 600 heat units as a standard?

MR. KLUMPP: Why, yes; I was working with the Wisconsin Gas Association at that time, and the engineers of the Commission and the Wisconsin Committee both examined the gas, of I think, 19 or 20 companies, and they were supplying over 600 at that time and that led them to the 600 standard.

MR. GILMOUR: Had it anything to do with the illuminating value?

MR. KLUMPP: It had. That was the heating value standard when they maintained the high candlepower standard that was then in vogue.

MR. GILMOUR: That was the heating value standard which maintained the candlepower of the open-flame burners at that time?

MR. KLUMPP: Yes, sir.

MR. GILMOUR: And in the change which the Wisconsin Commission made there was no change in the heating value of the gas, but only a change in the designation of the standard from a candlepower to a heating value, based on the same gas?

MR. KLUMPP: That is as I understand it. (Mr. Klumpp further testified that the "State of Wisconsin has changed its standard to 520 heat units" within the last six months.)

* * *

MR. KLUMPP: . . . Another point about the quantity of gas oil: We couldn't use an equal quantity of the gas oils that we are now getting. We have to cut the quantity of oil per thousand to maintain the continued service of our machines.

CHAIRMAN AINEY: I don't quite understand that.

MR. KLUMPP: The point is: We are using now about 3.8 gallons of oil

per thousand cubic feet. Our machines are designed to-day to make use of that quantity of oil. This oil vaporizes in the machine under certain heats and temperatures. After the gasolines are distilled off, a certain per cent. of the average oils which we are getting now have a very high percentage of carbon and are heavy and require differing temperatures, and if we put them into the gas machines at the rate of say, 3.8 or 4 gallons per thousand, our machines stop up in a very few hours. A gas machine ordinarily will run 1500 to 1800 hours on good gas oils. We find now that we have to take our machines down and clean them out every 500 to 700 hours with these heavier oils.

CHAIRMAN AINEY: Well, that is a matter that would not be remedied by any change in B. t. u. standard, would it?

MR. KLUMPP: Yes. If we can reduce the quantity of oil we use per thousand in those machines we are enabled to run the machines longer and maintain the efficiency and gasify it.

CHAIRMAN AINEY: I see.

MR. KLUMPP: I would illustrate it by a rich mixture in an automobile. The more gasoline you put in there, the richer it is and the quicker it carbonizes it and the less power you have. If you put in a lean mixture, it seems that you can get more power out of the gas you use. We are simply choking up the gas we use without getting the efficiency out of the oil.

* * *

MR. GILMOUR: What have you to say, Mr. Klumpp, as to the effect on the service to the ordinary consumer of such a reduction in heating value as these companies are now asking for?

MR. KLUMPP: Well, I might repeat my automobile story. The richer the gas, the more inefficiently it is burned in its utilization. We have determined by test and experiment that a gas of a lower heating value can be used with higher efficiency in the consumers' appliances, due to the fact that the gas burns with equal efficiency with a wider range of adjustment. The richer the gas, the closer the adjustments must be made, and if there is no adjustment, there is a carbonizing and a loss of efficiency by deposition of carbon on the vessels. We have also determined in distributing the gas that a lean gas can be distributed more uniformly, because it hasn't the higher percentage of light oils and condensibles, which drop off a rich gas and pick up again, and it is the lack of uniformity of gas delivered to the consumer that causes this deficiency with the richer gas. This has been demonstrated in a number of states where the heating values have been reduced, so to speak, out of what we may call the danger zone. The danger zone is that zone where we cannot deliver absolutely uniform gas under the best conditions due to the percentage of condensible hydrocarbons in the gas.

We have also made a record of a number of complaints after the consumers' appliances have been adjusted to meet this change in conditions, and the complaints have all been cut very considerably. I remember—I haven't got the facts with me, but the city of Chicago was operating under an average of 20,000 complaints a day on 22 candlepower gas and when they changed to a heating value standard their complaints, after the adjustments were made, dropped 60 per cent.

CHAIRMAN AINEY: What was the heating standard?

MR. KLUMPP: The heating standard was changed to 565. An application is now pending there for 500.

* * *

MR. GILMOUR: Does the temperature have more effect on the richer or the leaner gas?

MR. KLUMPP: Well, on the richer gases. That is due to the condensible hydrocarbons. The oils of these hydrocarbons are deposited in the gas holders at night and as soon as the sun strikes them in the morning they are picked up, and the gas will vary from day to day and also vary from season to season.

MR. GILMOUR: And in the winter time does this condensation in the rich gases take place in the distribution system?

MR. KLUMPP: It does.

* * *

ARTHUR HEWITT, General Manager of the Consumers Gas Company, of Toronto, Canada, called on behalf of the petitioners was duly sworn. An extract of his testimony is as follows:

MR. GILMOUR: What is the heating standard of the gas which you supply in Toronto, Mr. Hewitt?

MR. HEWITT: The heating value for October and November, 1919, was 532 and 536, respectively, for those months. Then the Government standard was lowered in November to 450, and our supply was changed for December to 506; January, 1920, 499; February, 500; March, 498; April, 492; May, 493; June, 488; July, 484; August, 488; September, 487.

* * *

MR. GILMOUR: Have you the standard as expressed in the Government rule?

MR. HEWITT: I have, sir.

MR. GILMOUR: Will you read it, please?

(Mr. Hewitt stated that the standard of 520 B. t. u. adopted June 26, 1915, had been modified so that Section 4, Chapter 87 of the Gas Inspection Act of Canada now reads as follows:)

"The Standard Calorific Power of the Gas supplied by the undertaker at the prescribed testing place shall be four hundred and fifty British Thermal Units per cubic foot of saturated gas when burned in saturated air and the volume of gas corrected for a temperature of sixty degrees Fahrenheit and a pressure balanced by a column of thirty inches of mercury at the same temperature."

This is the order.

* * *

MR. GILMOUR: Now, Mr. Hewitt, that is still the standard?

MR. HEWITT: That standard was in February last, continued until further notice. I had the honor of making the representation before the Department, and this letter, which I am afraid Counsel has not seen—I arrived late and I haven't had an opportunity to confer with him—is from the chief engineer of the department, dated the 27th of February, 1920:

"Confirming my telegram of this date, I beg to advise that an Order-in-Council has been passed fixing the calorific standard for gas at 450 B. t. u. until further notice. This, I think, may be regarded as a fairly permanent arrangement."

* * *

MR. GILMOUR: Now, Mr. Hewitt, what has been your experience as to service with the lower calorific value of gas?

MR. HEWITT: We have confirmed in practice absolutely the experience that we learned of in England in the very much lower standard there. The Com-

mission will probably remember that the investigation in England with regard to a lowering or a fixing of a reasonable standard of calorific value for gas dates back to the year 1900 and that in 1905 a special committee, composed of both the House of Commons and the House of Lords, was appointed and spent many months of intensive investigation particularly to find some point of economic standard that would represent the highest percentage of efficiency. They were not satisfied before a period of years was given for the determination of this fact, and during the latter years of the war, 450 B. t. u.'s was fixed as probably the minimum that gas companies should be asked to work to, largely because it conserved the greatest amount of coal, which was very important, and gave a result that would be most satisfactory to the consumers. * * * For absolute confirmation, as near as it can be obtained, we took the month of April, 1918, and the month of April, 1920, making a complete analysis not of a thousand accounts, but of all of our 122,000 customers.

(Mr. Hewitt then testified to the facts and figures which are set forth in detail in Exhibit 3, pages 38 to 42, of the "Report of the Committee on Calorific Standards" of the Association. These figures show no increase in the use of gas due to the reduction in B. t. u. He further stated that the difference of atmospheric temperature during these two months of April "was just three degrees.")

* * *

MR. GILMOUR: What have you to say, Mr. Hewitt, as to the complaints which have followed, if any, by reason of the reduction in calorific standard?

MR. HEWITT: Our experience has shown absolutely no increase, and I may be pardoned if I make one reference. I telephoned Sunday night before I left home down to our trouble department. I said: "How many complaints have come in to-day?" We have 123,000 customers, Mr. Commissioner, and the total number of complaints of all kinds for the day was six.

MR. GILMOUR: And are your customers and your company satisfied with the service that is being given at the lower calorific standard?

MR. HEWITT: Absolutely.

MR. GILMOUR: Is there anything else, Mr. Hewitt, that you can say that you think will be of help to the Commission in regard to this matter?

MR. HEWITT: I think not, excepting this fact, that in making our representations before the Department at Ottawa—you see, the Federal Government controls the supply of gas for the whole Dominion and we have to satisfy them—and after many months of investigation with regard to the representation we made these standards were fixed ,and our arguments were based not upon what could be demonstrated in a laboratory case. We felt that anyone would be foolish who would try to make it appear that gas of one quality was equal to a gas of a very much lower quality, if they were both tested under the same conditions, but, as we did show, in practice it was altogether likely. This was proven in England, as well, that less gas would be used by the consumers with a gas of a lower standard than they would use with a gas with a higher standard. Mr. Klumpp has presented that argument here fully, and here we show that a lower grade gas can be used, and with greater satisfaction if it is used, than a higher calorific value.

* * *

MR. GILMOUR: I did not understand whether your conclusion was that the final lowering of the standard in England was due to the investigation of the committee of the House of Parliament or due to conditions which required the husbandry of resources.

MR. HEWITT: Just by way—just to visualize it, there is evidence in the form that it appears in the original minutes of the House of Commons' and the House of Lords' report, with the greatest gas men that England at all events has ever known favoring it, and the conclusions of the committee at that time were such as to establish in England a standard of calorific value of 500 B .t. u. at that time. About 1909, it was really effective. The standard of calorific value long before the war was fixed deliberately at 500 B. t. u.'s. It was lowered during the war. They have been perfectly satisfied, but the necessity for further conservation made it absolutely essential that they should cut down to a lower minimum than they had been working under, and there was one important place in England supplied at 350 B. t. u.'s with, they said, satisfaction. I don't know the facts on that ——.

MR. GILMOUR: Well, is the 450 standard in vogue in England?

MR. HEWITT: With one exception, the South Metropolitan Area, which, because of their dividends—something—there is some arrangement of a sliding scale, that their dividends increase and diminish as the price of gas varies. They are supplying to-day, I think, a maximum of 520. Efforts were made in England for the protection of the companies themselves to create a penalty for those who would supply gas above the standard more than a few B. t. u.'s, so important was it to conserve fuel. There was a penalty on the companies if they did not keep within a very reasonable variation of the minimum standard.

(As previously noted, a flexible standard has recently been adopted in England.)

(Mr. Hewitt further testified that his company had not made any great reduction in the heating value immediately after the new standard was introduced since it was then only a temporary measure, and with 123,000 consumers it would have been impracticable to take care of the necessary adjustments if a return to the old standard were to be required. After the 450 B. t. u. standard was made permanent, his company reduced the heating value about 10 or 20 B. t. u. at a time, observing the effect of each reduction.)

* * *

MR. HEWITT: . . . Briefly, the following reasons were given by those interested for the request (to make the 450 B. t. u. standard permanent:)

1. There was urgent need of conserving coal and oil throughout the country, and the granting of the request would conserve approximately 100,000 tons of coal per annum.

May I say, Mr. Chairman, that every ton of coal and every gallon of oil we get has to come from your great country, so we are as anxious to conserve them as you are.

2. That aside from the need of conserving coal, it has been proved in Great Britain and in Canada during the past few years that it was an economic waste for gas companies in Canada to continue manufacturing and distributing to their consum-

ers gas of 520 B. t. u. per foot, or higher, as required by the Dominion Government standard of 1915.

3. That a gas of approximately 450 B. t. u. per cubic foot, the then prevailing British standard, was quite satisfactory for Canada; that it was a more economical gas to manufacture, and one from which the consumer obtained in actual everyday practice a higher percentage of thermal efficiency per foot than from the 520 B. t. u. gas.

4. Explanation of this fact involves a close study of the effect of inerts or combustible gases in coal or water gas when consumed; the effect of atmospheric nitrogen on flame temperatures in consumers' appliances, etc.

5. We recall, further, that on the 24th of November, 1919, the request of the Gas Association was temporarily granted; that the following order in Council was passed, and became operative immediately.

Then follows the order of November 24, 1919.

* * *

F. C. FREEMAN, Gas Engineer of the Providence Gas Company, Providence, R. I., called on behalf of the petitioners, was duly sworn. An abstract of his testimony is as follows:

MR. GILMOUR: What is the standard—calorific standard—of the gas manufactured by your company in Providence?

MR .FEEMAN: At the present time we are working on a standard of 510 B. t. u. per cubic foot, gross.

MR. GILMOUR: When was that standard made 510?

MR. FREEMAN: In the early part of May, 1920—effective the 17th of May, 1920.

MR. GILMOUR: Prior to that, what was the standard?

MR. FREEMAN: 580 B. t. u. gross per cubic foot.

MR. GILMOUR: Will you tell the Commission, please, what has been your experience from the reduction of the calorific standard in Providence and the rest of your territory?

MR. FREEMAN: When the standard of 510 from 580 was authorized by the Commission of Rhode Island, we were somewhat skeptical as to how we ought to go about making the reduction. We felt that we hadn't the experience ourselves on the B. t. u. of 510 per cubic foot; and we rather felt that, in going from 580 to 510, we would get into all sorts of trouble—that we would have any amount of complaints. With 68,000 consumers, we felt that we would have such a flood of complaints that we could not handle the situation at all, so we decided that we would make the reduction from 580 down to 510 in an arbitrary period of a month. Well, we reduced—we practically went down to 530 B. t. u. in a week's time from 580, and we were surprised that we had no complaints at all. It simply astounded us, and so we went down to 510 B. t. u. in three week's time from 580 with practically no complaints at all, not any more than we ordinarily would have.

* * *

(Mr. Freeman then testified to data indicating that this change in standard was not responsible for increased use of gas. Though arranged slightly differently, the information and figures given were ap-

proximately those contained in Exhibit 6, pages 44 to 47 of the "Report of the Committee on Calorific Standards" of the Association. He further testified as follows:)

I have made a further study, just the other day, before I came up here, and arbitrarily considered the city fathers of the city of Providence. We were opposed in making this change before the Commission by the city of Providence, city of Cranston, the city of East Providence and some public spirited citizens particularly. I was interested to see what the effect of the change in B. t. u.'s had on this particular group of consumers, and I arbitrarily took 24 of the city fathers, councilmen, aldermen, mayor, city engineer, public service engineer of the city of Providence, and made a study of their gas consumption, which I can summarize in a very few words.

For the six months previous to the reduction in B. t. u.'s—this was on a 580 B. t. u. standard—the 24 consumers used 453,000 cubic feet. That was from November, 1919, to May, 1920. Now, during a similar period, but one year previous—we also were operating on 580 B. t. u.'s—these same 24 consumers used 452,000 cubic feet. In other words, it is striking that there is only a difference of a thousand cubic feet one year as compared with the same period the year previous. Now, for the six months after the reduction in B. t. u.'s these same 24 consumers used 426,000 cubic feet of gas. That was from May, 1920, to November, 1920. Now, during the same period a year previous, when we were operating on 580 B. t. u. gas, these 24 consumers used 480,000 cubic feet of gas. In other words, on 510 B. t. u.'s they apparently used 8,000 cubic feet of gas more out of a total of 426,000 cubic feet, or an apparent increase of 2 per cent., which may be due to the reduction of B. t. u.'s from 580 to 510 ——.

MR. GILMOUR: Or to any other cause whatsoever?

MR. FREEMAN: Or to any other cause whatsoever, but blaming it on the reduction of B. t. u.'s it would only amount to 2 per cent. on this particular group. . . .

* * *

GEORGE E. WHITWELL, called on behalf of the petitioners, was duly sworn. An abstract of his testimony is as follows:

MR. GILMOUR: Professor Whitwell, what is your business?

MR. WHITWELL: I am a member of the faculty of the University of Washington, Seattle, and consulting and chemical engineer in that city and state.

MR. GILMOUR: Were you called in as an expert in conducting investigations instigated by the Commission of the State of Washington for modifying the calorific standard of gas?

MR. WHITWELL: I was called in on two separate investigations, both of which were instigated by the Public Service Commission, in the first one of which I was employed by that Commission and in the second one I was employed by the gas companies of Seattle, Spokane and Tacoma at the request of the Commission of that state, in an attempt to determine upon the best B. t. u. standard to be enacted as a future standard in the State of Washington.

MR. GILMOUR: What was the standard in the State of Washington when these investigations commenced?

MR. WHITWELL: 600 B. t. u.

MR. GILMOUR: And what was the standard arrived at after the investigation?

MR. WHITWELL: During the investigation we have been permitted to supply gas in those three cities as low as 450 B. t. u. The permanent standard has not been absolutely set by the Commission as yet. The investigation only has been in progress and it is the results of that investigation which are embodied in a report which I have to go before the Commission with.

(The recent order of the Commission establishing permanent standards for Seattle, Spokane and Tacoma is contained elsewhere in this issue.)

MR. GILMOUR: Will you state to the Commission, if consistent with your professional standing, what your conclusions have been as to the correct calorific standard which ought to be established in the state of Washington?

MR. WHITWELL: Insofar as the present plant is concerned and insofar as the Seattle Lighting Company is concerned, which is the largest of the three companies involved, having a list of consumers numbering between forty and fifty thousand, it is believed that the best value will be found somewhere between 470 and 480. . . . We believe that for each installation in each new set of economic conditions there is one correct technical point whereby the consumer and the company will get the greatest amount of good. It ultimately means that the consumer gets the gas for the least amount of money, because he pays the bill in the long run. As you can see, there are several different values that you can arrive at, dependent upon how you determine upon extending your plant; and all of them, as we have figured them, are somewhere below 500 and average around 480. The other two cities are very much smaller, . . . but for both of them we find the standard that will be recommended, working along the same lines as with the Seattle Company, will be very nearly the same; somewhere in the neighborhood of 480. . . . We are working it up for each individual company, in that way representing three localities in the state, and then will arrive at a recommendation very close to 480 B. t. u., which will be best suited to all three. There will be one standard for the entire state, but we are working it out from three cities. . . .

MR. BAKER: Have you anything, Professor Whitwell, that you can add for the enlightenment of the Commission on this subject; any data that shows the ground for your conclusions?

MR. WHITWELL: I think that it would be enlightening perhaps to show the conclusions that we in that part of the country have come to regarding the use of a laboratory test to determine what is going to happen under practical operating circumstances. With our stove and our water heater set up and our various vessels we started in to make tests exactly as they have been made and have been published in the literature from time to time. They are available in one or two places, and from those tests it has even been said that a great many people have got the opinion that the increase in the gas consumption is directly, or very nearly directly, proportional to the decrease of the B. t. u. content of the gas. We were no exception to the rule in that case. Undoubtedly, such tests in which your stove or your water heater is turned into

nothing more or less than a large sized calorimeter show these results as have been set forth in the literature. It became necessary to take a trip then up into Vancouver, where these same conditions held as have been discussed here regarding Toronto. When we got up there, we found results that were very similar to those that have already been told us regarding Toronto. We were forced to the conclusion at that time that it is not fair to try to predict what increase in gas consumption, if any, there will be upon decrease in B. t. u. by running tests of heating water or even tests where water is heated and boiling is maintained on a stove where the operation of that stove is conducted at about 50 per cent. efficiency, whereas I believe it to be conservative to assume the efficiency as obtained in the home to be 25 per cent.

I just wanted to put that fact in here; and it was that fact presented to our Commission in the State of Washington that enabled us to put into effect the testing of these three large plants in the State of Washington, so that the studies of actual consumption per meter under the change of B. t. u.'s could be made as it really exists in practice to-day rather than as it might exist if the ideal conditions of the laboratory were in effect in every case of the use of gas practically.

MR. BAKER: Do you believe, Professor, that within certain limits the leaner gas is more efficient than the richer gas?

MR. WHITWELL: Yes, sir. That is the reason that I qualified that statement that it is not directly proportional, but something less than that; yes, sir.

MR. GILMOUR: Professor Whitwell, in your judgment, after your investigation, will a gas of lower calorific value, such as you have in contemplation of recommending, be more or less useful to the housewife on her kitchen range?

MR. WHITWELL: It would be more useful to the housewife on her kitchen range. That is the only way we can explain practical results such as Mr. Hewitt and Mr. Freeman have given here this afternoon. It can be put this way: that the housewife will be able to utilize a greater percentage of the heat that is put into the gas in the form of British thermal units in practical operation.

MR. GILMOUR: And that is the explanation of the efficiency of the lower calorific standard?

MR. WHITWELL. As I see it; yes, sir. . . .

W. D. ANTRIM, Engineer in charge of the experimental and testing laboratories of the Welsbach Company, called on behalf of the petitioners, was duly sworn. He testified: "that in service the Welsbach mantle burner will give a very much better service on the leaner gas," and was of the opinion that 500 B. t. u. per cubic foot gives better results in a Welsbach mantle than 600.

CHARLES D. JENKINS, Engineer of the Department of Public Utilities of the Commonwealth of Massachusetts, called on behalf of the Commission, was duly sworn. Much of Mr. Jenkins' testimony dealing with the adoption of the 528 B. t. u. standard in Massachusetts and its effect on the service has not been included since it merely confirms the facts and information contained in Exhibit 1 and Appendix B of the "Report of the Committee on Calorific Standards" of the Association. As bearing on questions not directly covered in this report Mr. Jenkins testified:

MR. JENKINS: . . . Then, as bearing on conservation, I have taken here in 1915 and calculated the amount of oil in gallons per thousand feet of water gas and prepared these with the amount of oil used in 1918 and 1919. There has been a substantial decrease. For example, with one company in 1915 there were 3.33 gallons of oil used; in 1918, there were 2.76; in 1919, there were 2.98. The Board of Gas and Electric Light Commissioners has been succeeded by the Department of Public Utilities. A Complaint Department has been run for some years with the old Gas Commissioners and we have had no complaints from our gas consumers that could justly be laid to the change in the standard of gas.

DR. SNOW: Well, you have heard some remarks made by some of the witnesses here that the lowering of the standard made a more serviceable gas to the consumer than its maintenance at the standard of 570 or 600. What have you to say directly to that?

MR. JENKINS: Within reasonable limits, I believe it to be preferable.

DR. SNOW: What are those reasonable limits?

MR. JENKINS: I would not want to limit it, but I think, for example, a 500 B. t. u. gas, equally well made as compared with the 600 gas, the chances are that the 500 gas would give better efficiency with the appliances as now used by the people.

DR. SNOW: Would you go below that?

MR. JENKINS: I believe they might go below, but I don't know anything about that. My experience has not been with any lower gas than that. . . .

MR. JENKINS: There is one point in there that I would like to call your attention to, as bearing on the problem that we have set ourselves to, to improve the service. Good service consists, among other things, of a uniform quality of gas. In this volume is the report of the Gas Inspection Division for the Year 1919, and if I may read a few of the figures in regard to the variation in B. t. u.'s during the year from official inspections. There were seven companies whose variation was below 20; there were nine companies between 20 and 30—these are the official state inspections—12 companies whose variation was between 30 and 40; seven whose variation was between 40 and 50, and so forth. . . .

DR. SNOW: And it is your judgment, as I understand you, that the learner gas can be made more uniform than the gas of high standard?

MR. JENKINS: Yes, sir. . . .

Remember to notify this office of your change of address.

Some Recent Judicial Rulings as to the Rate Base

LOUIS L. BENEDICT

BEGINNING about 1916, the pages of public utility commission opinions are liberally sprinkled with the expression "abnormal prices." Commissioners were impressed with the idea that there is a natural level of prices, that pre-war prices were on that natural level and that war prices would return to it, as soon as the country should be released from the strain of war activities. When commissions were confronted with the necessity of increasing rates to maintain the solvency of public utilities, they were reluctant to fix upon such amounts as would place public utilities on a full level with other industry. At first they took an average of prices over a period of five years. Then, as the progress of time and the persistence of high prices made this a comparatively high base, commissions took an average of ten year prices. When this, in turn, became a considerable increase over 1914 prices, they fell back on the proposition that a public utility is entitled to a reasonable return on its investment, wisely made; that "investment" means "cost"; that the "value" prescribed by the Supreme Court of the United States as the base for rate regulation is not value in the economic meaning of "ratio in exchange," or in the business meaning of "what a thing will sell for," but that it is "value for rate regulation," which they defined to be an amount determinable by "equitable considerations." They were of the opinion that, equitably, a utility should have a return based on an amount no greater than investors, in the exercise of foresight and prudence, had put into the enterprise; in other words, that when the Supreme Court ruled that the rate base is "value," it meant cost, less the cost of property no longer used in the public service and less the cost of property not necessarily or wisely acquired. The fact that the Supreme Court, in ruling that the rate base is value, also ruled that it is not cost, was ignored.

Within the past six months the Courts have had occasion to review at least three commission decisions in which rates have been adjusted on a cost or "investment" basis. On August 7, 1920, the New Jersey Supreme Court, in the Elizabethtown Gas Light Company case (P. U. R. 1920F 1001), reversed the Commission, saying: (Swayze, J.)

> "I think it entirely clear that the failure to allow for prices at the time to which the rates apply, July 1, 1919, was an error. * * * It would be manifestly unjust to apply to a gas company a standard of value different from that applied to others."

In Consolidated Gas Company v. Newton (267 Fed. 231), complainant proved the cost of its property in detail; also the assessed value of its land, and, in a general way, that reproduction cost is about twice original cost. The Court held that the rate fixing law under attack was confiscatory because it did not permit a reasonable return on an amount equal to the assessed value of the land and the cost of the property. The Court said:

> "A profit based upon the enhanced value of the capital adds nothing in truth at all to the company's wealth. Though its capital be measured in more dollars, and so, too, its profit, that profit is still paid in the fallen dollar, and has no greater buying power than it had before. The increased valuation of the capital will for the years of the depreciated dollar leave the company exactly as it was;

it will merely prevent its being compelled to share its putative fair profit with its customers, which by hypothesis it should not be asked to do. The company gains nothing, the customers lose nothing.

"Indeed, all this is so much in the primer of economics that it is inconceivable it should be misapprehended as to working capital for instance, and the contrary view has crept in, I think, only when one thinks of the more permanent kinds of capital, and instinctively assumes that the rate will apply after that capital has resumed its former values, if it ever does. There is, in short, a tacit assumption that the valuation must last as long as the permanent capital. There is no warrant for that assumption, because precisely the same reasons which compel the 'rate base' to be raised, after a rise in price, compel it to be reduced after a fall. There is a natural enough reluctance to a continuous reappraisal of plants, and properly so. It must, of course, appear that the variation in prices is not transitory, and the period of probation before a company is allowed relief is precisely to insure against that possibility. The chance of loss during that period such companies must endure, and there is an inevitable 'lag' in readjustments in each direction. But, once it appears that the new price levels are not transitory, it is no answer to the company's complaint to say that at some future time prices may fall. When that time comes, if it does, the property must again be revalued; but meanwhile they are entitled to some protection, and since these have become questions for the courts, to the protection of the courts.

"The rule of the present reproduction cost, which is a necessary consequence of the foregoing argument, appears to me to have been either expressly or implicity recognized in all the cases in which the Supreme Court has passed on these matters. (Citing cases.) It is true that its application has not distinctly arisen since the recent rise in prices, but it is not possible that it should have general application, and yet not cover this, its most glaring illustration."

The most recent decision (which, at this writing has not been reported) was St. Joseph Railway, Light and Power Company vs. Public Service Commission of the State of Missouri, in the District Court of the United States, for the Central Division of the Western District of Missouri, November, 1920, Van Valkenburgh, J. The following is from the opinion:

"It seems unnecessary to consider any phase of this case except that of valuation, because, in my judgment, that consideration is conclusive upon the reasonableness of the present rates. Complainant, in its bill, charges that the same are inadequate, unreasonable and confiscatory, and prays injunction relief against their enforcement. Of course, the power of this Court is limited to an adjudication upon this point, it being invested with no rate-making power.

"It is my judgment that the great weight of authority is against the adoption of a standard of original cost as a controlling basis for determining present value. The present fair value is the object to be attained. Nor do I think it permissible substantially to restrict the inquiry to a period antedating present cost prices. In Joplin & Pittsburgh Railway Company vs. The Public Service Commission of Missouri, et al., in this same division of this Court, before Stone, Circuit Judge, Wade, District Judge, and the writer of this opinion, we said:

"'It appears upon the face of the report (of the Commission) that great, if not undue, emphasis was laid upon the original cost of the property * * * at a period greatly antedating that with which this investigation must deal; nor can we say that the present period of high prices is so temporary or abnormal that it may practically be disregarded in arriving at the value of complainant's properties. No one can say what degree of depression may ultimately come, but it is reasonably certain that the cost of the properties now under consideration will never again approximate figures prevailing in the years before the world war.'"

The Court then quotes from the Elizabethtown Gas case, and from the Lincoln Gas case (250 U. S. 256), in which the Court held that "a proper return for capital in gas plants and other public utilities furnishes no safe criterion for the present or the future." The Court,

in the St. Joseph, etc., Company case concluded:

"It follows that the method of valuation adopted by the Commission in the case at bar was wrong, and that the resulting computation necessarily reduced the total valuation of complainant's property so substantially as to make the rate based thereon inadequate and practically confiscatory. For this reason, it will be unnecessary to resolve other questions presented by the briefs. By common consent this was deemed the crucial question. The Court does not undertake to lay down any hard and fast rule in the premises. Many elements must enter into the final determination of a question of this nature. It is sufficient that the procedure disclosed by this record leads unavoidably to the conclusion that the relief prayed must be granted. It is so ordered."

The Court quoted also from the Kansas City Southern Railroad case (252 U. S. 178, March 8, 1920) in which the facts were that the Interstate Commerce Commission, in valuing railroad land, pursuant to an Act of Congress, made its estimate on the basis of original cost for the alleged reason that it is impossible to appraise railroad land on a reproduction cost basis. The Commission said that the reproduction value of land was "beyond the possibility of rational determination" and called for "inadmissible assumptions" and indulging in "impossible hypotheses." The U. S. Supreme Court nevertheless remitted the proceedings to the Commission to find the reproduction cost as best they might without directing them how to do it.

This ruling has a bearing on the ascertainment of present value of all public utility property. It has been said that value depends on earnings and that it cannot be determined in a rate case, because earnings are the very thing to be determined. It is doubtless true that the reproduction cost of public property involves a degree of speculation. Certain assumptions have to be made. Nevertheless, reproduction cost is the best evidence of present value. It is an economic rule, under competitive conditions, that value tends to equal the cost of reproduction. The rule under competitive conditions must be carried over and applied to properties under regulation, because it puts all industrial property on the same level. Anything less would be a denial of the equal protection of the law. Although open to criticism as in some degree speculative, it is the only feasible method of determining the present value of regulated property. For that matter, the determination of original cost is speculative where early account books are missing, as is almost always the case. Under the ruling in the Kansas City Southern Railway Company case, the speculative features of a reproductive cost appraisal are not fatal to its use.

Another interesting recent decision is that of the U. S. Supreme Court in the Ohio Valley Water Company case (253 U. S. 287, June 1, 1920).

There the Supreme Court of the United States reversed an order of the Supreme Court of Pennsylvania because the latter had refused to examine findings made by the Commission and to exercise its independent judgment thereon. The Pennsylvania Court had held that the Commission's findings were binding on the Court unless manifestly contrary to law. The United States Supreme Court held that the Company had not had its day in Court.

In other words, the most recent rulings of the Courts are in harmony with its earlier rulings that value and not cost is the basis for the computation of rates; that the best evidence of present value is

reproduction cost at present prices; that there is nothing so speculative in an estimate of reproductive cost as to prohibit its use, and that the Courts are not bound by methods adopted by Commissions in ascertaining present values.

The Practical Thing

The program for the annual convention of an organization such as ours is not an easy thing to prepare if it is to be satisfying and suitable to everybody; but a long step toward improvement was taken by the Executive Board at its meeting on December 15. The constructive criticisms and the suggestions received from many interested members have been carefully analyzed and considered and have resulted in a decision, which we think will meet with their general approval.

There is to be a reduction in the number of sectional papers to be presented at the next convention. Both papers and committee reports will be presented in abstract form, the abstracts to be prepared in collaboration with the author by a committee appointed by each section, and ample time is to be made available for the discussion of important subjects. The presentation of papers or abstracts is not to exceed twenty minutes except in most exceptional cases and every effort will be made to have discussion systematically arranged for and promptly forthcoming. The major part of one of the general sessions will be devoted to an open discussion of some of the most important problems then before the industry.

The simplification of routine and the practical utilization of the time devoted to sessions during our annual convention is a goal to which we have long been working. We think that the announcement of these definite plans to this end will be very welcome to our members.

The Educational Courses of the N. C. G. A.

The time limit has expired under which students enrolled in the Three Year Educational Courses are privileged to submit for criticism and rating, answers to the questions accompanying the lessons of the various courses.

The Proposed Employee Representation Plan

OF

The Peoples Gas Light & Coke Co.

(As covered by the Chicago "Journal of Commerce.")

Headline:

PEOPLES Gas Light & Coke Company has taken its employees into "partnership."

Workers will have equal voice with the management in directing affairs of the company, particularly as regards pay, hours, and working conditions, under a plan announced yesterday by President Samuel Insull.

This is believed to be the most far-reaching plan of its kind yet attempted by any industrial concern in the country. It was worked out by the Bureau of Commercial Economics after several months study of similar measures adopted by about three hundred American companies.

Not even the plan is being laid down by the company, so complete is its desire to allow employees to direct as well as work. A suggested outline was laid before the workers yesterday to be passed upon by them and either rejected or approved, or even improved, at a "constitutional convention" to be held in the near future.

The Convention will be composed of delegates from the company's various departments, on the basis of one representative for each fifty members. Elections will be under control of a committee of two employees and one management representative in each department.

"The object of the proposed employee representation plan is to provide means by which employees shall participate freely and fairly in settling all company questions that directly concern them," said President Insull.

The sharing of responsibility in conducting the affairs of the big public utility corporation will not get under full steam until a referendum vote of employees has been taken in which they will indicate their attitude. There will be submitted to them the final plan for conducting the employees' council, as finally worked out by the so-called "constitutional convention," which will take up the working draft of the constitution section by section.

The salient feature of the plan as it will be submitted to the employees is the naming of joint councils, composed of employees selected from the ranks at semi-annual primaries and elections. It is stated emphatically that no person can either vote or serve on the council, who is an official, superintendent or in any way might represent the company's interests. Even the man with power to "hire and fire" is barred from the golden seat of direction of the Peoples Gas Light & Coke Company.

The joint councils, according to the proposed plan, will be of three kinds, as follows:

(1) Department joint councils, one for each department, or group of small departments, meeting regularly once a month (and in special sessions when necessary) on company time, with full power to take up all questions concerning employees in their relations to the company.

(2) Special joint councils (when necessary) representing two or more departments and composed of the employee representatives and the management representatives of those departmental councils.

(3) A general joint council made up equally of employee representatives and managament representatives elected by the respective departmental councils, a sort of higher court.

An Industrial Relations Department, the head of it reporting directly to the president of the company, is provided for to tie in with the proposed employee representation plan.

Adoption of the proposed plan, substantially as proposed, will open to each employee, or group of employees, at least four ways of getting full consideration and fair treatment in any matter affecting him or them, namely:

(1) By taking it up with immediate superiors in the department where employed; or

(2) With the duly elected employee representative or representatives in the departmental joint council; or

(3) With the manager of industrial relations; or

(4) By direct petition to the departmental joint council.

The employee representative, or manager of industrial relations, or both, can also take matters up with departmental officials or refer them to the departmental joint council.

Procedure in all matters brought before a departmental joint council is provided for as follows: the departmental joint council's action in a given case goes to the head of the department concerned, as a recommendation. If he declines to follow it the employee representatives can appeal to the next higher company official or to the general joint council. The employee representatives in the general joint council can appeal from any higher official first to an executive council, composed of the vice-president and other officials, or secondly, directly to the president of the company.

In case of no agreement between the president and the employee representatives, according to the proposed plan as drafted, the matter at issue will be submitted automatically to arbitration.

The call for a "constitutional convention" will probably be issued immediately after Christmas and the convention held after the first of January. Then, if the employees approve, employee representation will be in effect before the first of February.

State of Washington Commission Modifies B. t. u. Standard

Following an extensive investigation the Public Service Commission of Washington has issued the following order modifying the B. t. u. standard in Seattle, Spokane, and Tacoma.

It Is Ordered, That gas furnished by the Seattle Lighting Company to consumers for lighting and heating purposes shall contain a total heating value of not less than 500 British Thermal Units nor more than 530 British Thermal Units per cubic foot; that gas furnished by the Spokane Falls Gas Light Company to consumers for lighting and heating purposes shall contain a total heating value of not less than 520, nor more than 560 British Thermal Units per cubic foot; that gas furnished by the Tacoma Gas and Fuel Company to consumers for lighting and heating purposes shall contain a heating value of not less than 450, nor more than 475 British Thermal Units per cubic foot.

Price Recession and Gas Rates

COMMODITY prices are said to be falling. From many quarters come reports that the deflation movement is well under way, but so far as the gas industry is concerned, the recession has not yet been felt. In several situations, citizens' associations have recently opposed applications of gas companies for increased rates on the ground that they are unnecessary in the face of a falling market and lower prices.

The position of gas companies at the present time should be made clear to the public and to regulatory bodies also. Such companies must obtain their manufacturing materials on contract. To purchase them as needed in an uncertain open market would endanger the continuity of the supply, which is the most vital factor in gas service. Until present contracts expire, gas companies cannot hope to benefit to any appreciable extent by lowering of prices. On the other hand, the recent advance in freight rates has added a large financial burden which, in most cases, has not yet been compensated for in the price of gas.

During and after the war, the prices of commodities advanced rapidly, causing a proportionate increase in the cost of manufacturing and distributing gas. On the other hand, long delays have almost without exception been experienced by companies seeking relief from inadequate rates. Regulatory bodies have felt that high prices were very temporary; and rate increases, when granted, have been generally insufficient to cover the higher cost of coal and oil alone, neglecting entirely the greater cost of labor, money and taxes. Contrary to expectations, the prices of these materials continued to advance, and the gas companies were forced to continue selling their product at rates so inadequate as to threaten the continuity of the supply in very many communities.

As showing the inadequacy of the past rate increases, statistics of a group of twenty-five gas companies operating in fourteen states indicate that the increase in the average revenue per 1,000 cubic feet of gas from 1914 to 1920 was only 24 cents, whereas the cost of oil and fuel increased 36 cents, and other expenses entering into the distribution and delivery of the gas to the consumer brought the total increased cost to the company up to 44½ cents. The increase in the average revenue was thus insufficient to cover the greater cost of supplying the gas to the consumer by 20½ cents per 1,000 cubic feet. In fact, the rates failed by 12 cents per 1,000 cubic feet to cover the actual increase in the cost of oil, coal and coke.

With the general price deflation, it will not be surprising if there is a clamor here and there for reduction in the price of gas and a return to former rates. An intelligent presentation of the facts to the public and regulatory bodies, who only recently have begun to realize the necessity for a more liberal attitude in dealing with the utilities if their essential services are to be preserved, will go far to counteract any unreasonable insistence in reducing rates.

It will take many months, in some cases several years, at rates which now yield a fair profit, to compensate gas companies for the accumulated losses which they sustained during a long period of starvation.

$100.00 Prize Slogan Contest

IN view of the small number of slogans submitted and their unsatisfactory character, it has been decided to extend the contest and to postpone indefinitely the award of the $100.00 prize offer announced in these pages in November. The contest will be open, therefore, until such time as a slogan is submitted which in the opinion of the judges warrants the prize of $100.00.

Those who have already participated in the contest are asked not to lose heart at this announcement, but to continue to submit slogans so that the one chosen may not alone be worthy of the prize money but may please all of us and be fully acceptable to the industry as a whole.

Although many excellent slogans were received, evincing a real interest in the contest, the majority were commonplace commercial statements such as "Gas the Modern Fuel," "Gas Lightens Labor," etc., etc., which utterly fail to convey the thought expressed in our original announcement, to the effect that "we want a slogan which will convey in a few words, the essential relationship of the gas company to the public, to whom it furnishes an indispensable service."

To submit a slogan which is acceptable, therefore, you must first get in the proper frame of mind by casting out all thoughts of commercialism. Think of the gas business, not as selling gas and gas alone, but rendering a distinct service of indispensable character to all who ask for it. Before you attempt to write, put these questions to yourself: "How can I express, in a few words, just what the gas industry stands for?" "What is the most important message the gas industry can carry to the American people?" "How can I state, in a few words, that the gas industry is a public benefactor and is striving for the good will of its customers?" And, finally: "What can I say that will make people everywhere exclaim: 'Well, it is good to see the gas industry go on record in such a manner. They are certainly trying to do the right thing by us.'"

If you give the subject the study and concentration you should, you will be surprised at the original slogans that you can write. The mere fact that the contest has been extended indefinitely should not delay you in sending in your contributions. The closing date now becomes any date upon which a slogan is submitted which, in the opinion of the judges, is deserving of the prize.

Let us have some real slogans from now on.

Associations Affiliated with A. G. A.

Canadian Gas Association

Pres.—C. S. Bagg, Montreal.
V.-Pres.—E. H. Caughell, St. Thomas, Ont.
2d V.-Pres.—Col. D. R. Street, Ottawa, Ont.
Sec.-Tr.—G. W. Allen, Consumers' Gas Co., Toronto.
Conv., 1921.

Empire State Gas & Electric Association

Pres.—H. W. Peck, Mohawk Gas Co., Schenectady, N. Y.
V.-Pres.—C. G. M. Thomas.
Treas.—E. H. Rosenquest.
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.

Illinois Gas Association

Pres.—W. M. Willett, Aurora, Ill.
Sec.-Tr.—R. V. Prather, DeWitt-Smith Bldg., Springfield, Ill.
Conv., 1921.

Indiana Gas Association

Pres.—W. W. Goodrich, Winchester, Ind.
V.-Pres.—J. D. Forrest.
Sec.-Tr.—E. J. Burke, Citizens Gas Co., Indianapolis, Ind.
Conv., 1921.

Iowa District Gas Association

Pres.—W. H. Taylor, Omaha, Neb.
Sec. Tr.—H. R. Sterrett, Des Moines Gas Co., Des Moines, Ia.
Conv., 1921.

Michigan Gas Association

Pres.—J. W. Batten, Detroit City Gas Co., Detroit, Mich.
Sec.-Tr.—A. G. Schroeder, Grand Rapids Gas Light Co., Grand Rapids, Mich.
Conv., 1921.

Missouri Association of Public Utilities

Pres.—J. H. Van Brunt, St. Joseph Railway, Light, Heat & Power Co., St. Joseph, Mo.
Sec.-Tr.—F. D. Beardslee, 315 N. 12th St., St. Louis, Mo.
Wiley F. Corl, Chmn. Affiliation Com., Mexico Pwr. Co., Mexico, Mo.

New England Association of Gas Engineers

Pres.—W. F. Norton, Nashua,N. H.
V.-Pres.—V. E. Bird, New London, Ct.
Burton Smart, Portland. Me.
Sec.-Tr.—J. L. Tudbury, Salem Gas Light Co., Salem, Mass.
Conv., 1921.

New England Gas Sales Association

Gov.—H. J. Pettengill, Jr., Blackstone Valley Gas & Electric Co., Pawtucket, R. I.
Sec.—M. Bernard Webber, 67 Milk St., Boston, Mass.

New Jersey State Gas Association

Pres.—F. R. Cutcheon, Long Branch, N. J.
V.-Pres.—Jacob B. Jones, Bridgeton, N. J.
Sec.-Tr.—H. E. Mason, Consolidated Gas Co. of N. J., Long Branch, N. J.
Conv., 1921.

Pacific Coast Gas Association

Pres.—W. M. Kapus, Northwest Gas & Electric Equipment Co., Portland, Ore.
Sec.-Tr.—W. M. Henderson, 445 Sutter St., San Francisco, Cal.
Conv., 1921.

Pennsylvania Gas Association

Pres.—J. H. Keppelman, Reading, Pa.
V.-Pres.—E. L. Smith, Towanda, Pa.
Luther Gaston, Lebanon, Pa.
Sec.-Tr.—W. O. Lamson, Chester County Gas Co., West Chester, Pa.
Conv., 1921.

South Central Gas Association

Pres.—C. B. McKinney, 505 Scollard Bldg., Dallas. Tex.
1st V.-Pres.—F. L. Weisser, San Antonio Public Service Co., San Antonio, Tex.
2d V.-Pres.—F. C. Armbruster, Southwestern Gas & Electric Co., Shreveport, La.
Acting Sec.-Tr.—C. H. Seidenglanz, Dallas, Tex.

Southern Gas Association

Pres.—E. C. Stothart, Charleston, S. C.
1st V.-Pres.—J. A. Forney, Charlotte, N. C.
2d V.-Pres.—J. C. Nichols, Bluefield, W. Va.
Sec.-Tr.—G. H. Smith, City Gas Co., Norfolk, Va.
Conv., May, 24, 25, 26, 1921, Savannah, Ga.

Wisconsin Gas Association

Pres.—Bruno Rahn, Milwaukee, Wis.
Sec.-Tr.—Henry Harman, 182 Wisconsin St., Milwaukee, Wis.
Conv.—Milwaukee, March 22-23, 1921.

OTHER ASSOCIATIONS

Natural Gas Association of America

Pres.—Harry J. Hoover, Cincinnati, Ohio.
Sec.-Tr.—Wm. B. Way, 904-5 Oliver Bldg., Pittsburgh, Pa.
Conv., 1921—Cincinnati, Ohio.

Society of Gas Lighting

Pres.—Alex. H. Strecker, Newark, N. J.
V.-Pres.—W. Cullen Morris.
Sec.—Geo. G. Ramsdell, 130 E. 15th St., New York, N. Y.
Treas.—Wm. J. Welsh
Conv., 1921.

Southwestern Electrical and Gas Association

Pres.—Burr Martin, Dallas, Texas.
V.-Pres.—A. Hardgrave,
C. E. Corder,
A. H. Warren.
Sec.—H. S. Cooper, Slaughter Bldg., Dallas, Texas.
Treas.—J. B. Walker.
Conv., 1921.

Michigan Commission Adopts Standard Classification of Accounts

THE Michigan Public Utility Commission at a public hearing held in Lansing, November 30th, adopted the theory and general plan of the Uniform System of Accounts for Gas Corporations recently accepted by the National Association of Railway and Utilities Commissioners and ordered that on and after January 1, 1921, all gas utilities under the jurisdiction of the Commission be required to set up their accounts in substantial accord with such system.

To gas company accountants this order, effective with the new year, will be a happy augury for the success of the movement to make national standardization effective. Michigan with one of the most recently organized commissions has the distinction of being the first State to adopt the National Classification.

For some time past a committee of the Michigan Gas Association in cooperation with the statistical staff of the Commission has been drafting a classification of accounts for that State and this work was practically completed when the National Classification was promulgated. The promptness with which the Commission recognized the value of national uniformity as applied to their State is a tribute to their breadth of vision and the adaptability of the National Classification to local needs.

Following closely on the notification of the Michigan Commission's order the Association received the following copy of a notice sent out by the State Corporation Commission of Virginia:

COMMONWEALTH OF VIRGINIA.
STATE CORPORATION COMMISSION.

RICHMOND, Dec. 18, 1920.

ROANOKE GAS CO.,
Roanoke, Va.

GENTLEMEN:

At a conference held by the Engineer of this Commission on December 17, 1920, with representatives of several of the Gas Companies of this State, it was unanimously agreed that a uniform classification of accounts for gas utilities, as prepared by the Committee of the National Association of Railway and Utilities Commissioners, should be adopted by the Commission of the State of Virginia and put into effect. This action followed a similar action about two weeks ago, recommending the adoption of the uniform system of accounts for electrical utilities.

It is the intention of this Commission to require annual reports covering operations for the year 1921 from gas utilities. It was pointed out that such reports are most successfully made when the companies' accounts are kept under a system readily providing the figures called for in the report.

While without direct authority to say that the Commission will issue an order authorizing this system of accounts, since the time is short before the first of the year, when, if adopted by the Commission, the Companies will need to begin their new accounting system, I call your attention to the probability that an order establishing this system of accounts will shortly be issued. If you require copies of this system in advance of the slightly delayed issuance of the probable formal order,

you can probably obtain them most expeditiously by writing direct to the Law Reporting Company, 17 East 36th St., New York City. We are unofficially informed that the charge will not be in excess of $1.00 per copy.

Yours very truly,

JUDSON C. DICKERMAN,
Engineer.

The prompt and favorable action taken by these two States cannot help but be an inspiration to gas company accountants everywhere. Some delay has arisen in the receipt from the publisher of copies of the Uniform Classification of Accounts which we announced in the January issue would be distributed to member companies. As soon as these are received the distribution will be made with a letter urging the following action:

"In accordance with a resolution passed by the Executive Board, you are urged to have the proper accounting representatives of your organization familiarize themselves with this Classification, and to take such action as local conditions suggest to further its adoption by your State Commission at such time as the matter is taken under consideration by them."

As an accountant you should *know* the National Classification, and as soon as copies are distributed, you will be in a position as stated in the January issue "to spread the gospel" whenever the opportunity presents itself.

The movement for universal adoption has been most auspiciously started. Let's keep it going until National Standardization of Gas Company Accounts becomes an established fact.

An Appreciation

The President of Stevens Institute in renewing his own subscription and in placing the *Bulletin of Abstracts* on the shelves of the library for the benefit of students wrote as follows: "As far as my experience goes, I think the *Abstracts* are almost unique in arrangement for maintaining through the years a simple plan of reference—the separate sheets on any one of the classifications as found in the succeeding volumes and numbers falling into their proper places as previously provided for.

"It is this feature particularly that I want to bring to the attention of our seniors in connection with their report writing. It should be of great service to them as indicating the value of method in the collection of data and also as giving them a practical illustration of the application of method."

How It Is Done In Emporia

THE frequent assertion that managers of gas plants are too occupied with operating difficulties these days to take much interest in publicity work, does not hold true in Emporia, Kansas, where Carl B. Wyckoff, president and manager of the local plant, is obtaining excellent results from newspaper publicity by utilizing the material issued by the Association and either rewriting it or giving it an ingenious turn to make it applicable to his company.

In his "Chats With the Gas Man," two of which are reproduced here, Mr. Wyckoff has hit upon a novel and effective manner of getting his ideas to his consumers in a way that breeds friendliness. Not only do these notices get closer to the people because of their detachment from anything savouring of direct advertising, but they secure a wider reading because of their insertion in preferred positions in the newspapers. Generally, Mr. Wyckoff closes the notices with his name, which gives them the importance of communications addressed to the editor. This same method has been followed of late by Mr. Elsman, of the King's County Lighting Company, who signs his name to advertisements appearing in the New York City and Brooklyn newspapers, to give them that personal appeal so necessary in all publicity of a "good will" nature.

A great many of the news articles issued to gas company executives by the Association, have found their way into the newspapers of Emporia over the signature of Mr. Wyckoff. In other words, Mr. Wyckoff has not only rewritten the articles to make them of local significance, but he has credited to himself, as manager of the Emporia plant, statements made by persons in other parts of the country who so far as the people of Emporia are concerned are not interesting at all. This is an altogether efficient use of this material and we have been advising others to do likewise for a long time.

Mr. Wyckoff does not gather his material wholly from that issued by the Association, however. He is a careful reader of the gas trade papers and whenever an article strikes his fancy, he calls up his editors and arranges to have it reproduced for the benefit of his consumers. Some time ago his attention was called to a cartoon appearing in one of the Chicago newspapers entitled "Gasoline Alley." It depicted a man satisfied with an automobile joy-riding bill of $40, but wild with wrath over a gas bill of $6.35. Mr. Wyckoff could not secure permission from the publishers to use the cartoon, so he wrote the following breezy account and had it published in his newspapers:

SUCH IS LIFE.

Wife—"My, John! Our bill for gas last month was $6.35."

John (nonchalantly)—"Oh, that's all right, dear. You know the weather was good. Course we did not drive any at night, but we took a nice trip on Sunday, you know. You shouldn't be so close. I think the pleasure was well worth it. I paid out $30 for tires and $10 for repairs, but I am not kicking. We only have one life to live, you know."

Wife—"I don't mean the bill for gasoline, dear. I mean the bill with the gas company."

John (jumping up, stamping wildly around and pulling his hair)—"My goodness! Woman, do you mean to tell we that you run up a bill of $6.35 when all that you use gas for is to cook three meals a day and heat the water for a family of six people? I'll go right down there this minute and tell that gas man what I think of him. He's a crook, a liar, a thief. I'll—I'll ?|$&('-é!" (cut out by censor).

Your Gas Man.

Complaint—Cause—Remedy

In a recent talk to employees of the general service department of the Consolidated Gas, Electric Light and Power Company, of Baltimore, Charles M. Cohn, Vice-President of the Company, touched upon the nature of consumer complaints very much in this fashion:

Now to the remedy. In the first place, in handling complaints, whether they be regarding service or high bills, take nothing for granted; and in the second place, enter into no arguments nor attempt technical explanations of complaint causes. If we assume conditions we are apt to make the very errors we so often decry in those who do the complaining. By taking nothing for granted, but merely ascertaining the trouble, the name of the complainant and his address, we will possess sufficient information for use as a basis of investigation, and with this knowledge we can then apply the effective remedy.

He concluded: "The real cause of the trouble will almost invariably be found to be entirely local, easily located and readily remedied and this will be done without charge. Our recent study of a number of complaints in which the cause of the trouble was, in good faith, alleged to be the quality of gas supplied, confirms our views and demonstrates beyond question our ability to provide and maintain satisfactory gas service."

"Let Not Thy Left Hand Know What Thy Right Hand Doeth."

Galena, Ill.—The City Council of Galena has passed an ordinance raising rates of the municipally-owned water plant 40 per cent., effective January 1.

NOTE.—This is the same Galena that blew out the gas earlier in the year. Of course the gas plant was not municipally-owned. That is a horse of another color—in Galena.

CHATS WITH YOUR GAS MAN

Emporia people are watching the gas company. It has promised better gas and competent service, and is living up to those promises. Five months of hard work has put the plant in better condition than it has been in for years, and when this work is paid for, the present rates will be gradually lowered. The gas company is seeking to give the best of service, and in return feels it has a right to expect the co-operation of the people. It is the people's gas company—if they should refuse to use gas, the company would cease to exist. But gas is the best fuel in the world, and the company feels secure in the continued patronage and good-will of the people.

Every progressive town has its gas company—sometimes progressive and sometimes not. The Emporia Gas Company is fast getting in line with the progress of the town in other directions, and is becoming a valuable asset to the town. The people want gas—the real stuff, and the repairs and improvements of the past few months insure the real thing in the flow of gas and in service. The company is yours to command, and if you lack anything it can do for you, it's your fault. Call up the office to tell your gas troubles.

CHATS WITH YOUR GAS MAN

Emporia housekeepers who cook on gas ranges doubly appreciate this convenience at Thanksgiving time, and other seasons of extra cooking. This year they are especially thankful for the good steady flow of gas, with the assurance that it will continue, and that the present high rates are only temporary. They are willing to cooperate with the gas company in its efforts to give good service and plenty of gas. The company will be able, with a few months of high rates, to pay off its indebtedness for repairs and maintenance, and then it expects to establish a maintenance fund which will take care of all such expenses in the future.

Emporia people don't have all the gas troubles in the world, nor all varieties of them. A shortage of gas coal, due to bad transportation, has forced the Illinois Northern Utilities Company to announce a gas schedule for Dixon, Ill. Gas service will be maintained only from 5:30 a. m. to 12:30 p. m., and from 5:30 to 7 p. m. Bakeries and the town's only newspaper are seriously handicapped by this arrangement, which probably will continue for several weeks, according to The Gas Record.

Intimate Talks with Emporia Consumers

Attracts Crowds Wherever It Is Used

Carrying on a rate or merchandising campaign? Don't neglect to use the Balopticon machine and set of A. G. A. slides. The machine is idle now and can be shipped immediately. Write for details.

Giving Information to Those Who Need It

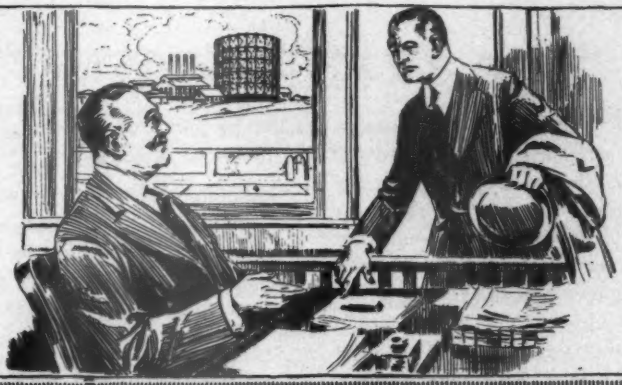
WE have recently started a bulletin information service for the editors of gas trade papers, editors of gas company publications and the state public utility information bureaus now in operation. The purpose of this service is to keep in close touch with the above persons and to supply them with information as fast as we obtain it, to the end that all of us may benefit.

In our first bulletin we mentioned the publication of the articles by B. C. Cobb, of Hodenpyl, Hardy and Co., and H. M. Addinsell, of the Investment Bankers Association, the former article entitled: "What the Investor Demands: What the Public Should Allow: What the Company should give," in the December issue of *Aera*, and the latter, entitled: "Why the Utilities are the People's Business," in the December *Review of Reviews*. We also mentioned the address given by Morse Dellplain, of the Northern Indiana Gas and Electric Company, before the employes of that company, and described a novel use of the A. G. A. booklet, "The Men Who Make Friends."

In the second bulletin we described the thrift campaign started in New York by Henry L. Doherty and Company and mentioned the series of articles on customer ownership by William H. Hodge, of H. M. Byllesby and Company, two of these articles having already appeared in the *Electrical World*, in the November 20th and December 11th issues. In the third bulletin we announced the action taken by the city council of Galena, Ill., in boosting the water rate of the municipally-owned plant 40 per cent. and pointed out the significance of this action in view of the previous step taken in regard to the gas plant. In this bulletin we also enclosed proofs of all Doherty "thrift" advertisements appearing in the metropolitan newspapers to date.

Any one at all familiar with editorial work knows that it is extremely difficult to obtain good material for publication and that there is not the friendly interchange of information among editors there should be. A real knowledge of this fact has prompted us to inaugurate our information service so that immediate use can be made of and the widest distribution possible given to articles or speeches or items favorable to the public utility business. Much of this information comes to you long before we hear of it, or, in some cases, we do not hear of it at all. We will appreciate it, therefore, if you will keep us advised of all information of value in order that we may send it on to those who will give it the distribution it warrants.

The Association has opened a western office in Room 1513, 122 South Michigan Avenue, Chicago. A complete file of all the publications and literature of the Association will be available for the information of our members. Notices of committee meetings and similar information will also be on file. The telephone number is Wabash 6000, Local 321.



"Sorry, But We Have No Gas Today"

Just suppose that when you want gas we said: "Sorry, but we're entirely out of it today. We expect to have some next week."

Guess not.

Gas is on tap for your use any time, day or night. At the mere turn of a valve, it is ready when you want it, where you want it. And all because we maintain uninterrupted service.

Consider what this means to us.

When coal companies advance their prices, can we say "Your coal is too high! We won't buy until it comes down"?

Not much.

When the oil man raises the price because he can get so much more for his oil by refining it for the automobile, can we tell him that we'll stop making gas until prices come down?

No again.

And how about labor, the interest on money, and other essential factors? Can we wait until they cost less?

No.

These things we *must* have. To get them, we *must* pay the price. That's why, no matter how much we regret it, we are forced to ask more for our gas.

To us it is a matter of being able to continue in business. To you, the average consumer, it means only a slight additional cost per month.

(Insert name of your Company here)

MEMBER OF THE AMERICAN GAS ASSOCIATION

Tenth of a series of twelve "good will" advertisements now being prepared for member companies. Price of series complete with matrices in either three or four-column newspaper width, $36.00. Price of three-column electrotypes, $48.00. Orders for single advertisements accepted at $3.00 per matrix and $4.00 per electrotype.

The A. G. A.'s Motion Picture

When this issue of the MONTHLY reaches you, we hope to have finished and ready for distribution to our membership a motion picture film setting forth the present-day needs of the gas industry. The scenario has been written and passed upon by a committee of prominent gas men, several of whom have had experience with films of somewhat similar nature in the past, and the picture is now being made partially by actual photography, using real characters, and partially by animated drawings, with titles of the usual screen type.

The film will be about six hundred feet in length and will run on the screen from eight to nine minutes. When it is completed and the positive prints made for circulation throughout the industry, we will give our membership full details of a comprehensive plan whereby the film can be shown in local motion picture houses and other places.

The Service Charge

Many requests have reached us for the experiences of companies in adopting and collecting a monthly service charge. Will those who have adopted such a charge supply the following information to Association Headquarters?

What steps were taken to secure permission of the regulatory bodies (where this was necessary) to institute a service charge?

What is the amount of the service charge, and is it paid in advance for the monthly period?

How is the service charge handled when applied to the user of a prepayment meter?

Kindly send us copies of all newspaper advertisements, gas bill stickers, posters, hand bills or other literature used in telling the public the nature of or reason for making a monthly service charge; and tell us how long this material was used or distributed before the service charge was put into operation.

Public Utility Facts

Under this title, the Hamburg Gas and Electric Company, of Hamburg, Pennsylvania, published in its local newspaper most of the material contained in the booklet, "The Men Who Make Friends," which has enjoyed a very successful distribution throughout the industry. While the booklet was written with the gas company employe in mind, it gives such a clear explanation of utility operation that the public should be given an opportunity to read the facts. It was this thought that prompted the Hamburg company to utilize the booklet as newspaper copy.

COMMERCIAL SECTION

H. S. SCHUTT, Chairman — LOUIS STOTZ, Secretary — A. P. POST, Vice-Chairman

Recuperators and Regenerators

A series of articles by HENRY L. DOHERTY, & Company's Industrial Heating Dept.

ARTICLE 3.—DESIGN OF REGENERATORS.

IN our first article we stated that regenerators are generally used for furnaces operating at temperatures above 1400° F. This is due to the limiting characteristics of the materials suitable for recuperators at high temperatures.

From an operating standpoint the recuperator is always more desirable than the regenerator, because, with the former no reversing valves are necessary and we obtain constant temperatures in the preheated air which result in constant furnace temperatures.

In order that a regenerator may function properly the flow of flue gases and air must alternate periodically from one chamber to the other. Otherwise one chamber would heat up to furnace temperature and the other would cool down to the temperature of the air.

In most of the older types of regenerative furnaces, the regenerative chambers are very large and the valves are reversed by an attendent after rather long intervals of time, in some cases every 20 or 30 minutes. With such a furnace the maximum efficiency cannot be obtained because the large regenerative chambers greatly increase the radiation loss, and unless the chambers are large the waste gases leave at a high temperature, carrying away a great amount of heat which should be returned to the furnace.

Another objection to long intervals between reversals is, that the air entering the furnace is constantly decreasing in temperature until the valves are reversed, when the temperature suddenly jumps several hundred degrees with a resulting fluctuation in furnace temperature, which is very undesirable in most metallurgical work and absolutely prohibitive in certain heat-treating operations.

From the foregoing discussion we see that the most desirable regenerative furnace would be one with comparatively small regenerative chambers having a maximum of heat absorbing surface and reversing very frequently, so that the heat absorbing material will work over a very small temperature range.

Because of the difficulty and uncertainty of having an attendant reverse the valves at very short intervals, a type of automatic regenerative furnace has been developed in which the valves are reversed by mechanical means.

If a furnace is operated constantly at practically a uniform rate of fuel consumption, then the timing mechanism can be set so that the best efficiency will be obtained, but if the furnace is operated on varying gas consumptions, then the reversals should be in proportion to the amount of gas used rather than on a uniform time basis. Such a furnace may be made to reverse by means of thermostats or other temperature measuring de-

vices when a predetermined temperature has been reached, or, may reverse every time a certain quantity of gas has passed to the furnace. Such a furnace will be fully described in a subsequent article.

In designing a regenerator for a given furnace it is necessary to have about the same information and data as was necessary to design a recuperator and the same curves showing the thermal capacities of flue gases and air may be used.

Experience has shown that the mean specific heat of fire brick may be taken as 0.20 B. t. u. per pound; that we can only absorb about 6 to 7 B. t. u. per square foot of exposed surface per hour per degree Fahrenheit differential, and that the reversals shall be so frequent that the temperature of the brick during one period will only vary about 150° F.

The heat transmission co-efficient from gases to brick varies with the velocity of the gases over the brick surface. If our regenerative furnaces are operated on "natural draft" induced by a stack we will have a low velocity in the gases and consequently our heat transmission co-efficient will not exceed 2 B. t. u. per hour per square foot of surface per degree Fahrenheit differential temperature.

However, in metallurgical work where the furnaces are comparatively small they are seldom connected to a stack and in such a case the air is supplied to the furnace by a blower located in a central position and supplying several furnaces, while the flue gases are drawn through the regenerator by an exhauster which may also handle the flue gases from several furnaces. With such an arrangement we are able to get a rate of heat transfer as high as 10 B. t. u. per hour per square foot of surface per degree Fahrenheit differential temperature.

With any fuel that we may choose, the heat carried by the flue gases at any temperature will be more than sufficient to preheat the necessary air to the same temperature. This surplus of heat in the flue gases is greater with gaseous fuels than with any other kind; hence we always have a surplus of heat which has to be taken care of by radiation—by increased temperature in the discharged flue gases or by making some use of this surplus heat.

In the case of producer gas or blue-water gas we may use this surplus heat to preheat the fuel gas. The reason this cannot be done with all gases is because the hydrocarbons decompose and deposit carbon in the regenerators.

In order that the steps necessary for the design of a regenerative furnace may be clearly shown, we will illustrate with an example:

Our problem is to design a regenerative forge furnace, which will heat 24 pieces of stock per hour each weighing 34.5 pounds, to a forging heat of 2350° F. The furnace is to be fired with blue-water gas of the composition shown in Fig. 2, and the air is to be preheated to 2000° F. The furnace is equipped with a blower and exhauster so that we may use a rate of heat transfer of 6.5 B. t. u. per hour per square foot per degree Fahrenheit differential temperature. We may assume a mean differential temperature of 300° F. and assume that as normally operated, the flow of flue gases and air should be reversed every two minutes. We may assume a thermal efficiency of 25 per cent. for the furnace.

The general design of such a furnace is shown in Fig. 1. From the data given we can readily calculate the best practical furnace dimensions and also the meas-

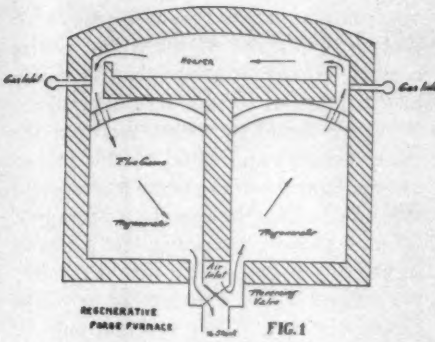


FIG. 1

urements and number of checker brick for our regenerators.

Total weight of stock to be heated per hour = 24 × 34.5 = 830 pounds.

Heat necessary per pound of steel from 60° to 2350° F. = 390 B. t. u.

Heat necessary per hour = 830 × 390 = 323,700 B. t. u.

We have assumed an over-all thermal efficiency of 25 per cent., hence we must supply 1,295,000 B. t. u. per hour. The blue-water gas which we are to use has a B. t. u. value of 310 B. t. u. per cubic feet. So we must supply 4200 cubic feet of gas per hour.

From Fig. 2, assuming that the flue gases enter the regenerative chambers at 2500° F., the products of combustion will contain 187 B. t. u.'s per cubic feet of gas used, or 4200 × 187 = 785,400 B. t. u. per hour.

From this chart we also find that it requires 95 B. t. u.'s to heat the air to 2000° F. necessary to burn 1 cubic foot of blue-water gas. We are to burn 4200 cubic feet of blue-water gas per hour, hence the air must take up 4200 × 95 = 400,000 B. t. u.'s. Therefore, we must design our regenerator with sufficient surface to take up 400,000 B. t. u. per hour with a differential temperature of 300° and a rate of heat transfer of 6.5 B. t. u. per hour per square foot per degree Fahrenheit differential temperature $\frac{400,000}{300 \times 6.5} =$ 205 square feet of surface in each regenerative chamber.

By using "split" brick for checkers we can greatly increase the surface exposed without increasing the volume of brick. The *effective* area of a split brick when used as a "checker" is about 0.55 square feet, so we need $\frac{205}{0.55} = 375$ checker brick in each regenerative chamber.

If we set the checker brick so that there is 50 per cent. open space we can use 17 split brick per cubic foot or will need 373 ÷ 17 = 22 cubic feet in each regenerative chamber.

The dimensions of the regenerative chamber will be governed to some extent by the dimensions of the furnace but in general it may be said that the regenerators should be so proportioned as to maintain a high gas velocity through the checkers and have the gases pass over all the checkers.

The walls of the regenerative chambers will serve as a heat transmitting medium but this effect will be largely offset by the increased radiation loss from the regenerator walls.

Referring again to our figures we find that 785,400 B. t. u. are carried into the regenerators per hour and that 400,000 B. t. u.'s of this is returned to the furnace by the preheated air. The balance, 385,400 B. t. u. is dissipated by radiation through the walls and as sensible heat in the flue gases. If we allow 45,400 B. t. u. per hour for radiation losses we have 340 B. t. u. per hour as sensible heat in the flue gases. This is sufficient heat to correspond to a temperature of 1260° F.

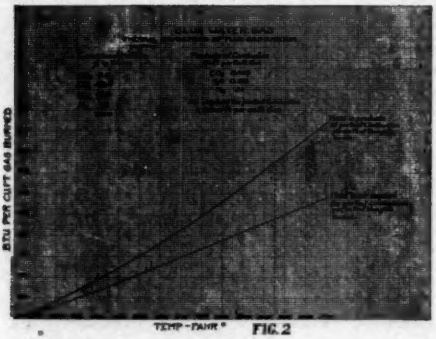


FIG. 2

This temperature might be too high for our reversing valves and it would be necessary to so adjust our damper that a portion of the flue gases would be wasted from the furnace door or through an auxiliary flue.

In a problem like the present one where blue-water gas is used for fuel it would be very economical to use the surplus heat to preheat the fuel gas. This might be done by having a double set of regenerative chambers instead of a single set, or by using a metal recuperator on the outlet of the regenerator.

Because of the greatly increased flame temperature resulting from the use of air preheated to 2000° F. we would realize a much greater economy than is shown by the return of 400,000 B. t. u. per hour. We have found by actual test that the same furnace required 6000 cubic feet of gas per hour when the regenerators were not used. This represents a saving of 6000 — 4200 = 1800 cubic feet per hour of 310 B. t. u. gas. With fuel at 75 cents per million B. t. u.'s the saving would be $10.00 per day. This saving would be sufficient to pay for the entire furnace in six months. If we added a recuperator or double regenerators so that the fuel gas was also preheated we would realize an additional saving of $3.00 per day.

With a regenerative furnace which is entirely automatic and occupies very little, if any, more floor space than a non-regenerative furnace of the same capacity, and which shows enough saving in fuel to pay for the furnace in six months, it would seem that the manufacturer could obtain an economical and permanent solution to his fuel problem, by substituting automatic regenerative gas fired furnaces for his present direct fired furnaces.

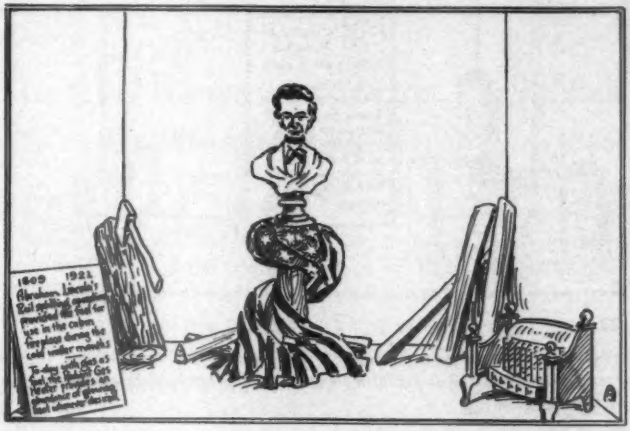
Speakers' Bulletin No. 4

The Illinois Committee on Public Utility Information has recently issued Speakers' Bulletin No. 4, entitled, "Regulation of Public Service Companies—Just and Reasonable Rates."

The material in this bulletin consists quite largely of citations from court decisions, findings of public utility commissions, and statements of men engaged in public utility regulations, concerning the intricate problem of regulating rates, together with a sketch of the origin and history of the Public Utilities Commission of Illinois. Two important features of the bulletin are a sample 10- and 30-minute talk in which are given fundamentals of rate making from the layman's viewpoint.

Copies of this bulletin will be furnished by the committee from its office at 203 South Dearborn Street, Chicago.

Window Display Suggestions for February



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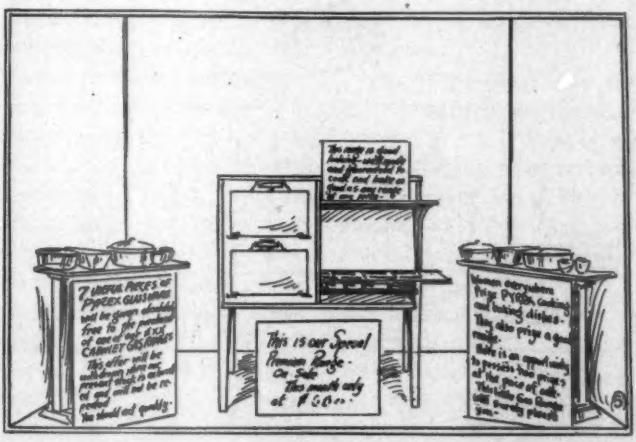
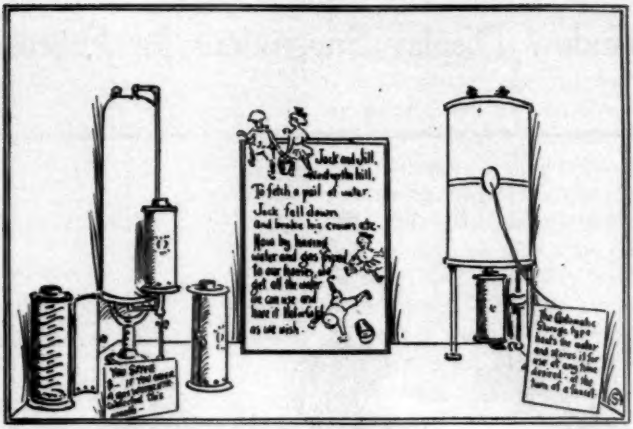
A bust of Lincoln draped with a flag—some rough logs and an axe—and in contrast a modern gas heater in the foreground with a card to tell the story.



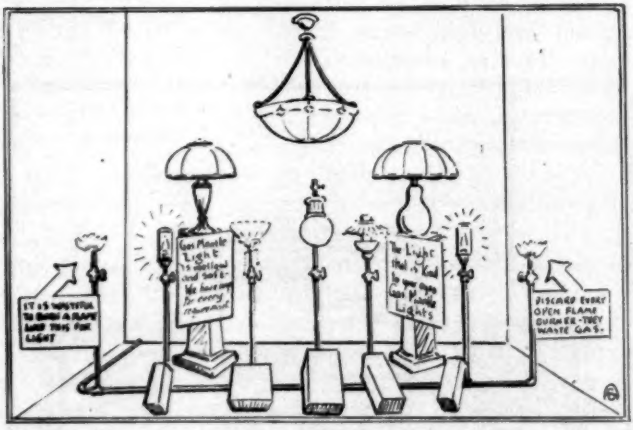
22b

Purchases are being reduced—the above display is being suggested as a stimulant. A special medium quality range with some attractive premium might be offered as an inducement for a limited time.



22c

Water heaters, both tank and automatic, are shown with a Mother Goose rhyme to provide color and attraction. Cut out the figures from a nursery rhyme book and paste on the cardboard before lettering.



22d

From a pipe line along the front of the window connect an assortment of gas mantle lamps with an open flame burner or two shown for comparison. Boxed lamps may be shown on the floor with fixtures, domes or portable lamps burning attractively.

The Gas Range as a Ready Profit-Maker

Is This Source of Income Being Overlooked by the Merchant Plumber?

T. F. J. MOFFETT, in *The Plumbers' Trade Journal*

ACCORDING to reports received from trade representatives traveling through various parts of the country, there are a great number of merchant plumbers who are showing the modern, highly attractive gas ranges in their showrooms and selling them readily with satisfactory profit. The good showrooms are exhibiting samples of these products in conjunction with the other wares of the trade, and in practically all instances sales are easy and in good volume. The gas range as made to-day, with its artistic finish and highly serviceable cabinets, glass oven doors, various sized burners and general cleanliness and efficiency for cooking purposes, has won a secure place in the hearts of the housewives.

On the other hand, it is known that many masters who should be pushing this valuable contributor to added profits are content with catalogs for selling purposes, or are not giving this easy seller the attention it deserves.

It may be that all are not "sold" on the wisdom of including the gas range in the regular stock of merchandise carried; yet the probability is that owing to the generous demand for the regular line of plumbing and heating items, and the excellence of the display these items make of themselves, the gas range simply has been overlooked.

The fact remains, nevertheless, that the gas range is such an attractive article, and in such universal demand, that no showroom is complete without it. It fits artistically alongside of any display of regular trade fixtures, no matter how select or modern they may be, and adds dignity to any showroom. It is a long stretch since the gas cooker was a dingy contraption naturally associated with the idea of a dark corner in an out-of-the-way part of the kitchen.

To-day the gas range is just as much a source of pride to the American woman as any other article in the equipment of her home.

The real reason why the gas range should never be overlooked, however, is the fact that it is a ready seller and that it is nothing short of reprehensible short-sightedness to fail to keep it prominently among the articles the master plumber has for sale. It is easily sold and easily installed.

There was a time when trade tradition was such that the plumber and steamfitter thought always of the work attached to sales of plumbing and heating fixtures. They looked forward to nice jobs of overhauled kitchens and bathrooms and new heating layouts. The thought of selling items that brought immediate cash turnover and promptly com-

pleted transactions were not conceived of as the right kind of business.

The merchant master of these times, however, knows better. He relishes the quick sale and the speedy profit. He knows that there is better business in the frequent turn of goods into cash, and the prompt re-investment of the cash in new goods, than in the more drawn-out method of spending weeks on transactions involving men and materials.

This is the crux of the difference between the merchant and the mechanic. No man in the trade will ever turn away from the regular line of installing work, new or alteration; but the big idea in merchant plumbing is to sell goods and realize prompt profits as wel as to sell the usual mechanical services of the business.

So it is that no real manager of a plumbing and heating business can afford for an instant to overlook any legitimate article of merchandise in his line. There are many others outside of strictly plumbing and heating materials aside from the gas range. But the gas range pops conspicuously into mind after reading some trade reports. It does not seem possible that merchant plumbers in some parts of the country are regularly handling, showing and selling gas ranges with gratifying results, while in other parts the same article is getting but scant attention, yet that seems to be the indisputable fact.

We have heard much of the high cost of living and the general tendency lately of the buying public to tighten the strings on its purse. It is undoubtedly true that the buyer has become more wary in certain lines, such as clothing and shoes. There is a general feeling that the retailers of these goods have been making too much money and that prices should come down. In fact, they have come down. Yet at no time has there been a falling off in the inclination to buy the really serviceable things of the home. Furniture dealers, for example, are sold far ahead of their production. The prices paid for furniture were never so high before. The buyer wants the high-grade goods just the same, and the only trouble the dealer has is to get the goods.

A well-known authority on the buying tastes and habits of the American public stated in a recent article that after retailing over 100,000 different items of merchandise to a list of customers running over 6,000,000 in number, the most outstanding revelation is that the buying taste and the buying power of the people of this country have steadily increased every year. He finds that the Americans want the best and are willing to pay for it.

Without exception, too, the higher priced articles sell the best, and there is a particularly strong and insistent demand for anything that saves labor in the homes or on the farm.

What can any one offer the American housewife that more eminently satisfies her earnest desire for labor-saving, economy and efficiency in the home, than the modern gas range? How can any dealer leave himself without an up-to-the-minute display of these much desired fixtures without leaving himself at the same time open to the charge of being unprogressive?

How can that woman's sense of the fitness of things be satisfied when she fails to find that article of such universal use prominently displayed among the items exhibited in the one place where she expects to find it, the showroom of the master plumber or fitter?

The gas companies have not been lax, it is true; but the gas consumer has never got over the suspicion that the gas company is always over anxious to sell gas. Then there are millions of homes that are obliged to make their own gas, and the plumber has no company competition to meet at all.

The gas range is such a quick and easy profit maker, and its sales amount to such a big item when totaled at the end of the year, that it is indeed surprising to see reports that in some localities the plumbing trade is apparently not fully alive to one of its best business assets.

The World's Greatest Producer

THE United States is the most productive country on earth. It leads all the rest of the globe in yields of the mine, the soil, and the factory. This fact was tersely and cogently set forth by Judge Elbert H. Gary, chairman of the Board of the United States Steel Corporation, in an address which he made before the American Iron & Steel Institute, as its president, in New York, in May, 1920. Judge Gary then said:

"Notwithstanding the United States has only 6 per cent. of the world's population, and but 7 per cent. of the world's land, we produce:

"20 per cent. of the world's supply of gold.
"25 per cent. of the world's supply of wheat.
"40 per cent. of the world's supply of iron and steel.
"40 per cent. of the world's supply of lead.
"40 per cent. of the world's supply of silver.
"50 per cent. of the world's supply of zinc.
"52 per cent. of the world's supply of coal.
"60 per cent. of the world's supply of aluminum.
"60 per cent. of the world's supply of copper.
"60 per cent. of the world's supply of cotton.
"66 per cent. of the world's supply of oil.
"75 per cent. of the world's supply of corn.
"85 per cent. of the world's supply of automobiles."

In the face of a marvelous showing like that, who can for a moment doubt the future prosperity of this country?

MOULDER PREACHER DIES IN PEEKSKILL

Evening World, **December 7, 1920.**

Mr. Lent Worked at Trade: Served Church Without Pay 29 Years

The Rev. Alexander K. Lent, the "'moulder' preacher," is dead of pneumonia at his home in Peekskill after a week's illness. The Rev. Mr. Lent has been a character in Peekskill for a generation. Every week for forty years he has worked at his trade in the union stove works of this village. On Sundays he had moulded souls in the quaint little "Pond Lilly Church" in Broad Street. The Rev. Mr. Lent was a member of Iron Moulders' Union No. 6.

Entirely self-taught, Mr. Lent was ordained in 1891, when 35 years old by the conference of the Wesleyan Methodist Church in New York City. He took charge of his church here then, and continued there, always without salary or expenses, until his death. He is survived by his widow, a son, a daughter, and three sisters.

Standardization

Standard Gas Range Specifications

ON December 4, the following letter was sent to all Manufacturer Company Members of the Association with a form of agreement to be entered into between the Association and manufacturers carrying the construction of gas ranges in conformity with the Specifications adopted November 18, 1920:

TO ALL MANUFACTURER COMPANY MEMBERS:

On November 3rd, there was sent to you from this office a copy of the Standard Gas Range and Gas Fixture Specifications, which were subsequently adopted at the annual Convention of this Association on November 18th.

The recommendation of this Committee, which revised these specifications, was, that a period of eight months be allowed to elapse from the time of their adoption before they became effective, thus giving the manufacturers ample time to make any changes in their equipment, which will be found necessary in order to comply with the specifications.

The value to the industry in adopting specifications of this character will be apparent, but it remains for the gas companies and manufacturers to strictly live up to the requirements of these specifications, if they are to serve the purpose for which they have been prepared.

You will be supplied at cost with a sufficient number of standard tags (proof enclosed) for attachment to gas ranges which you make in strict conformity with these specifications, and you are further requested to fill out the enclosed form of agreement, which should be returned to this office as soon as possible.

Assuring you of our desire to cooperate with you to the fullest extent possible, we remain

Yours very truly,

(Signed) OSCAR H. FOGG,
Secretary-Manager.

A similar letter has also been forwarded to all gas company members requesting information as to the intention on their part of purchasing all gas ranges that are built strictly in accordance with the Standard Specifications approved by the American Gas Association. By a joint compliance on the part of gas companies and the manufacturers supplying the efficient and approved gas range the purpose is served.

Since these letters have gone out we have had an especially gratifying response from the gas companies. They are resolved to buy only those appliances and ranges which conform to our specifications. This particularly applies to several of the large syndicates and their subsidiary companies.

All gas ranges constructed hereafter in compliance with Standard Specifications will bear the Association tag.

TECHNICAL SECTION

R. B. HARPER, Chairman H. W. HARTMAN, Secretary H. R. COOK, Jr., Vice-Chairman

The Utilization of Tar in a Water Gas Apparatus

GEORGE H. WARING

Editor's Note: During the discussion of the Gas Oil Committee's Report at the recent Convention, considerable interest was displayed by the members in the economies possible in the use of tar in water gas generators and reference was made to the 1906 Proceedings of the Western Gas Association as containing full information on this subject. It was also stated that with the present price of generator fuel many companies were now disposing of their tar at much below its generator fuel value. As the 1906 Proceedings of the Western Gas Association are probably not available to many members the paper presented by Mr. Geo. H. Waring at that time is reprinted herewith.

OIL tar was first used as generator fuel in a double superheater reverse steam Lowe water gas apparatus in 1898 by Mr. I. N. Knapp, then superintendent of the Omaha Gas Company. It was demonstrated to be such a success that its use has been continued in Omaha up to the present time.

The method of utilizing oil tar as generator fuel, as adopted in Omaha, is as follows:

The tar is freed from all but a small percentage of water by passing it through two separators and from thence in a tar well where it is allowed to stand for some time. The tar to be used in sets is pumped from the bottom of the tar well into the top of the first condenser, where it is stored previous to being used. As the temperature of the gas passing through this condenser is about 180°, the temperature of the tar is raised to about 130°, and all the remaining water is driven off and hot tar free from water is used.

An analysis of this tar is given below. In the engine room a steam pump, running continuously, draws this tar from the bottom of the condenser and maintains a pressure of 30 pounds at the tar meter on generator operating floor. The outlet of the tar meter is connected with two tar nozzles, which are connected into the steam inlets at the top of the 11-foot generator diametrically opposite. The nozzles as shown by sketch are outside of the generator and are subjected to no greater heat than the entering steam. Tar is admitted with steam only on a down run, which is about every third run. The tar is turned on after the steam, and turned off before the steam is shut off. The 1½-inch induction pipe is kept clear and gives no trouble unless the tar is allowed to leak in. Any leak in the tar valve will cause a deposit of carbon at the end of the 1½-inch steam pipe. Carbon deposited in the induction pipe can be removed by taking out the 2x¾-inch bushing, carrying the ¾-inch nozzle, and inserting an auger of the same design as that used for cleaning standpipes.

The gas maker turns on the tar in generator after turning on the oil in carburetter, and turns off the tar before turning off the oil. After turning off the

tar, the tar pipe is blown out with steam which is connected at outlet of tar meter. When using tar on down run smoke will be noted at coal-hole doors, but if these doors are kept tight this smoke is not objectionable. A small quantity of lampblack will be noticed in ash pit when an excess of tar is used. The valve stem of the water-cooled hot valve accumulates some pitch, and should be scraped off and oiled about once a day to keep it working freely.

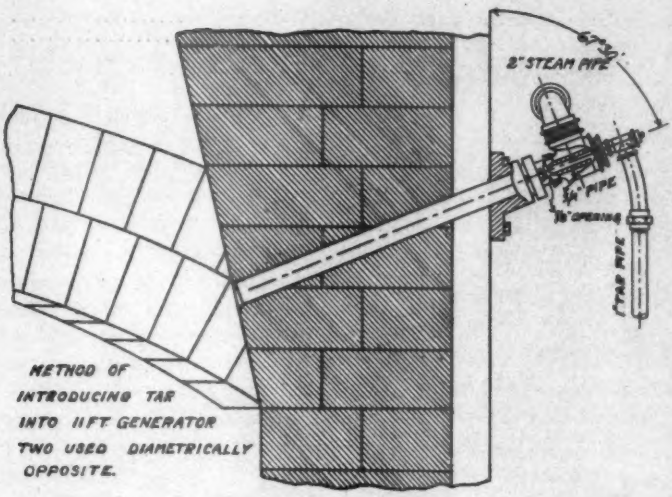
After making a down run when using tar there is quite a showing of smoke at the stack valve when generator blast is put on, but it disappears as soon as the secondary air is admitted. Our gas makers do not object to the use of tar in generators. They now look upon it as upon any other of the necessary functions of gas making. No unusual fouling of fixing chambers and no trouble from naphthalene have been noted, due to the use of tar in generators. Nor does it affect in any way the tar being made.

After using over 1,000,000 gallons of tar in our generators in the past seven years, thereby making a saving of over 4,000 tons of coke, we are able to give the following results as to the value of tar as generator fuel. We have been using tar with more or less success in varying quantities from 0.3 to 1 gallon per 1,000 cubic feet of carburetted water gas made. Our experience has been that we cannot use over 0.5 gallon per 1,000 efficiently when using oven coke and 0.4 gallon when using gas coke, except when making more down runs than every third run. When making fewer down runs than every third run a proportionately less amount should be used. After repeated tests under similar conditions, with and without the use of tar in our generators, we find that the average value of a gallon of tar free from water is equal to 8 pounds of New River or Pocahontas 48-hour oven coke, or 10 pounds of Youghiogheny gas coke. The writer has no data from Omaha as to the value of tar when used with anthracite coal. The following results are obtained from Mr. W. H. Gartley, engineer of works at Philadelphia:

Mr. Gartley found that a gallon of tar was equal to 7 pounds of anthracite coal, and that not over 0.25 gallon of tar could be used efficiently when using anthracite coal. The data from Philadelphia, like that from Omaha, represents average values taken from results extending over a period of several years. Oil tar has been used as generator fuel with more or less success in Kansas City, Waterbury, and Paterson. The writer has no data on this subject except from Omaha and Philadelphia.

As oil efficiencies are so variable under apparently uniform conditions we have been unable to determine definitely what the enriching value of tar is when used as generator fuel. It has an enriching value from the fact that by its use we are able to obtain better oil results than when no tar is used.

It will be seen from the analyses of samples of water gas taken at the bottom of the generator during a down run, with and without tar, that we have quite an increase in hydrogen, which reduces the percentage of carbonic oxide. Methane is increased by the use of tar. The fixed illuminants are unchanged, but the unfixed illuminants show by analysis an increase of 3 per cent. The chances are that the unfixed illuminants are much higher than shown, as it is impossible to determine accurately these constituents. They are certainly not less than shown, and doubtless much more. The appear-



ance of this gas when burning would corroborate the above; that is to say, that the full amount of illuminants is not shown in the analysis.

The calorific value (calculated from analysis) of these two gases as taken at the base of the generators is as follows: Without tar, 309.16 B. t. u.'s; with tar, 342.20 B. t. u.'s. If taken with the calorimeter it would probably be higher in the case where tar was used. The specific gravity of these gases, at 60° F. air = 1, as calculated from the analyses, is as follows: Without tar, 0.554; with tar, 0.456.

The average make per run, including all runs, is increased about 4 per cent. by the use of tar. The saving in labor and boiler fuel by the use of tar is so small that it would not be worth considering.

As we make about 0.70 gallon of tar per 1,000 cubic feet of carburetted water gas, the importance of disposing of our tar to the best advantage should be emphasized, and while we cannot utilize all of our tar in our generators, it will be seen that we can use from one-third to two-thirds of our total make in this way, leaving the remainder to be disposed of in other ways.

If we utilize half of our tar in our generators, we should be able to dispose of the other half at a better price per gallon than we could obtain by selling all of our tar.

We must appreciate the value of our own product, if we want others to, and we must be able to utilize this product to advantage when we are unable to sell it at a fair price.

Other papers show ways of utilizing tar besides that of generator fuel, therefore it is not necessary for us to sell any of our tar. We can dispose of all we make in our own plant.

The uses to which oil tar can be put are so numerous that the writer does not hesitate to predict that the day is not far distant when a gallon of oil tar will purchase a gallon of gas oil.

ANALYSES OF UNCARBURETTED WATER GAS FROM OMAHA, NEB.

	Without tar in generator	With tar in generator
Benzine vapor, C_6H_6	0.0	0.3
Carbonic acid, CO_2	6.8	7.5
Illuminants	0.5	0.4
Carbonic oxide, CO	39.2	23.3
Oxygen, O_2	0.5	0.6
Hydrogen, H_2	50.0	60.4
Ethane, C_2H_6	0.0	0.4
Methane, CH_4	0.8	4.2
Nitrogen, N_2	2.2	2.9
	100.0	100.0
B. t. u.'s per cubic foot	309.16	342.20
Specific gravity air = 1	0.554	0.456

The above samples were taken between fifth and sixth minute of an 8-minute run, hence high carbonic acid.

ANALYSES OF UNCARBURETTED WATER GAS FROM PHILADELPHIA, PA.

	With tar in generator
Benzine vapor, C_6H_6	0.0
Carbonic acid, CO_2	3.0
Illuminants	0.0
Carbonic oxide, CO	42.8
Oxygen, O_2	0.4
Hydrogen, H_2	50.2
Ethane, C_2H_6	0.0
Methane, CH_4	0.4
Nitrogen, N_2	3.2
	100.0

The above sample was taken during whole run, showing the average composition of "blue gas" without tar in generator.

ANALYSIS OF OIL TAR FROM OMAHA, NEB.

Sample of tar used in generator, 9-29-03.
Specific gravity, 1.1602.
Water, none.

Distillation Test.

Crude products of distillation	Per cent. by volume	Per cent. by weight	Sp. gr.	Fractions
Light oils (below 338° F.)	8.3	6.12	0.8733	Canary
Middle oils (338°-518° F.)	41.3	35.41	0.9948	Ch. Yel.
Anthracene oils (ab. 518° F.)	30.5	28.87	1.1018	Dk. Red
Residuum	....	28.96	....	....
Total	80.1	99.36	....	....

Note absence of water.

Cleaning Out Tar Separators

H. H. FERRIS, Newark, N. J.

THE accumulation of coal dust or coke breeze and other solid matter in the bottom of tar separators must be removed periodically. If the separators are pumped dry so that laborers can go in to clean them out, they are liable to float to the surface in many locations, and serious damage may result, especially if constructed of steel or concrete.

For several years The Public Service Gas Company has been using for this work, a 2 cu. ft. clamshell bucket rigged on a suitable small derrick, which is hand operated by a small winch on the mast. The Hayward Company built a "Midget Derrick" which is used for the smaller tar separators. A similar portable derrick with a longer radius using the same winch, takes care of the larger separators.

This equipment has been shipped around to our Works as needed. Its usefulness saves about half of the labor cost of this extremely dirty work, and permits the men to do this work without covering themselves with tar.

Report of Gas Oil Situation Available in Pamphlet Form

WE would call to the attention of our members that there is now available in pamphlet form the report on the Gas Oil Situation, brought up to date November 15, 1920, by the Technical Sub-Committee of the Gas Oil Committee and submitted at the recent Convention. Copies can be obtained from Association Headquarters at 10 cents for members and 20 cents for non-members.

The Committee has submitted the most complete and accurate survey possible of the situation gas companies are facing as to available gas oil throughout the country taking into consideration competition from other users, exports and imports, transportation facilities, etc. Statistical information of value is contained in the tables submitted with the report, which include: Gas Oil Requirements by States, 1920, Production of Crude Oil by States, Districts and Fields, and comparative consumption and production figures; Oil Refined and Products Made in 1920, Analysis of Exports and Imports, Transportation Facilities and several tables showing distillation, analyses and viscosity tests of oil samples submitted to the Committee.

The Committee has still under investigation the proper temperatures for the best handling of oils of various viscosities and is working in conjunction with the American Petroleum Institute in a survey of possible substitutes for distillate gas oil.

Some data was accumulated last year as to the effect of using low grade oils on the capacities of water gas machines, but the Committee desires to receive further information on this subject from member companies having experience in this connection. Considerable interest in this question was shown at the recent Convention and members are requested to forward data on any experience they may have had to Mr. W. H. Fulweiler of the United Gas Improvement Company, Philadelphia, Pa.

Time Occupied in Cutting Cast Iron Pipe

A record of the time actually taken in recent months in Philadelphia for cutting cast iron pipe by the use of chisels is given below:

Size of pipe	Method	Number of men	Time (minutes)
16	Dog chisel	3	28
16	Dog chisel	3	35
16	Dog chisel	3	35
16	Dog chisel	3	25
20	Dog chisel	3	43
20	Diamond point	1	60
20	Diamond point	1	70
20	Diamond point	1	65
20	Dog chisel	3	25
20	Diamond point	1	58
20	Dog chisel	4	35
20	Dog chisel	4	28
20	Dog chisel	4	32
30	Dog chisel	3	40

WALTON FORSTALL, *Chairman,*
Cast Iron Pipe Standards Committee.

Classified Directory--Manufacturers of Gas Equipment

Company Members Only, American Gas Association, Inc.

ACETIC ACID

The Sherwin-Williams Co., Cleveland, O., New York, N. Y.

ARC LAMPS (Gas)

General Gas Light Co., New York, N. Y., and Kalamazoo, Mich.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Welsbach Co., Gloucester, N. J.

AUTOMATIC CONDENSATION RECEIVERS

Plant Engineering & Equipment Co., Inc., 192 Broadway, New York, N. Y.

BENCHES

J. H. Gautier & Co., Jersey City, N. J.
Riter-Conley Company, Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.
The Gas Machinery Co., Inc., Cleveland, Ohio
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.

BENCH IRON WORK

Banner Iron Works, 4560 Shaw Ave., St. Louis, Mo.
Davis & Farnum Mfg. Co., Waltham, Mass.
Isbell-Porter Co., Newark, N. J.
Riter-Conley Company, Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
The Bartlett Hayward Co., Baltimore, Md.
The Gas Machinery Co., Cleveland, Ohio
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.
The Stacey Manufacturing Co., Cincinnati, Ohio
The Western Gas Construction Co., Fort Wayne, Ind.

BOILERS (Gas)

Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Hugo Manufacturing Co., West Duluth, Minn.
Wm. Kane Mfg. Co., Inc., 1915 Adams St., Philadelphia, Pa.
Kidde & Co., 169 Chambers St., New York, N. Y.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
The Ofeldt Gas Fired Boiler Co., Inc., Nyack-on-the-Hudson, N. Y.
The Bryant Heater & Mfg. Co., Cleveland, Ohio
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.

BOILERS (Gas for House Heating)

Dodd Heating Systems Limited, Toronto, Ont.
Kidde & Co., 169 Chambers St., New York, N. Y.
The Bryant Heater & Mfg. Co., Cleveland, Ohio

BOILERS (Waste Heat)

The Bartlett Hayward Co., Baltimore, Md.
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.

BLOWERS, BOOSTERS, EXHAUSTERS

Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Isbell-Porter Co., Newark, N. J.
Maxon Furnace and Engineering Co., Muncie, Ind.
The Needham Gas Appliance Co., 1 S. Lafayette St., New York City.
The Gas Machinery Co., Cleveland, Ohio
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The C. M. Kemp Mfg. Co., Baltimore, Md.
Monarch Engineering & Mfg. Co., American Bldg., Baltimore, Md.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.
Wilbraham-Green Blower Co., Pottstown, Pa.
L. J. Wing Mfg. Co., 362 West 13th St., New York, N. Y.

BRAZING TABLES

Rathbone, Sard & Co., Albany, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.

BRICK, FIREBRICK

Gas Machinery Co., Cleveland, Ohio.
J. H. Gautier & Co., Jersey City, N. J.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Improved Equipment Co., New York, N. Y.
Laclede-Christy Clay Products Co., St. Louis, Mo.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.
Missouri Fire Brick Co., St. Louis, Mo.

BROILERS (Hotel)

Geo. M. Clark & Co., Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
The De Matteis Broiler System Co., Inc., New York, N. Y.
Rathbone, Sard & Co., Albany, N. Y.
The Michigan Stove Co., Detroit, Mich.

BURNERS (Industrial)

American Gas Appliance Co., 108 Lawrence St., Brooklyn, N. Y.
American Gas Furnace Co., 24 John St., New York, N. Y.
Century Stove & Mfg. Co., Johnstown, Pa.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Equitable Meter Co., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Charles A. Hones, Inc., Baldwin, Long Island, N. Y.
Hale Manufacturing Co., Chicago, Ill.
Hugo Manufacturing Co., West Duluth, Minn.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
The Maxon Furnace & Engineering Co., Muncie, Ind.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Needham Gas Appliance Co., 1 S. Lafayette St., New York City.
Tate-Jones & Co., Inc., 50 Church St., New York, N. Y.
The Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
The Eclipse Stove Co., Mansfield, Ohio
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The C. M. Kemp Mfg. Co., Baltimore, Md.
Monarch Engineering & Mfg. Co., American Bldg., Baltimore, Md.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.
The A. H. Wolff Gas Radiator Co., 4 Great Jones St., New York, N. Y.

BURNERS (Lighting)

Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
General Gas Light Co., New York, N. Y., and Kalamazoo, Mich.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Welsbach Co., Gloucester, N. J.

BY-PRODUCT OVENS
Andrews Engineering Co., Inc., Chicago, Ill.
By-Product Coke Corp., Chicago, Ill.
Foundation Oven Corporation, Woolworth Building, New York, N. Y.
Semet-Solvay Co., Syracuse, N. Y.
The Gas Machinery Co., Cleveland, Ohio
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Koppers Co., Pittsburgh, Pa.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.

BY-PRODUCT RECOVERY APPARATUS
Foundation Oven Corporation, Woolworth Building, New York, N. Y.
Isbell-Porter Co., Newark, N. J.
The Bartlett Hayward Co., Baltimore, Md.
The Gas Machinery Co., Cleveland, Ohio

BY-PRODUCT RECOVERY APPARATUS
The Koppers Co., Pittsburgh, Pa.
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.

CALORIMETERS
The Brown Instrument Co., Phila., Pa.
D. McDonald & Co., Albany, N. Y.
Maryland Meter Works, Baltimore, Md.
Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.
Superior Meter Co., Brooklyn, N. Y.

CASING, TUBING (Steel)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

CASTINGS (Grey Iron)
Banner Iron Works, 4560 Shaw Ave., St. Louis, Mo.
The Western Gas Construction Co., Fort Wayne, Ind.

CHARGING COAL
Isbell-Porter Co., Newark, N. J.
Phillips, Lang & Co., Chicago, Ill.
The Bartlett Hayward Co., Baltimore, Md.
The Gas Machinery Co., Cleveland, Ohio
The Western Gas Construction Co., Fort Wayne, Ind.

CHIMNEYS (Radial Brick)
Alphons Custodis Chimney Construction Co., Marquette Bldg., Chicago, Ill.

COAL AND COKE (Conveyors, Crushers, Screeners)
R. H. Beaumont Co., 315 Arch St., Philadelphia, Pa.
Riter-Conley Company, Pittsburgh, Pa.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Isbell-Porter Co., Newark, N. J.
Phillips, Lang & Co., Chicago, Ill.
The Bartlett Hayward Co., Baltimore, Md.
The Gas Machinery Co., Cleveland, Ohio
The Godfrey Conveyor Co., Elkhart, Ind.
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.

COAL TAR PRODUCTS & CHEMICALS
The Barrett Company, 17 Battery Place, New York, N. Y.

COCKS (Ranges, Water Heaters, Service and Meter)
A-B Stove Co., Battle Creek, Mich.
Acme Brass Works, Detroit, Mich.
Claus Automatic Gas Cock Co., Milwaukee, Wis.
Hays Mfg. Co., Inc., Erie, Pa.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Kitson Co., 2837 Oakford St., Philadelphia, Pa.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
Peninsular Brass Works, Detroit, Mich.
Standard Brass Works, Detroit, Mich.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Roberts Brass Mfg. Co., Detroit, Mich.

COMPOUND FOR CLEANING GAS METERS AND GAS STOVES
Standard Chemical & Supply Co., Cambridge A, Mass.

COMPRESSORS
Plant Engineering & Equipment Co., 192 Broadway, New York, N. Y. (Air Compressors).
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The C. M. Kemp Mfg. Co., Baltimore, Md.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.

CONDENSERS
Cruse-Kemper Co., Ambler, Pa.
M. T. Davidson Co., 154 Nassau St., New York, N. Y.
Davis & Farnum Mfg. Co., Waltham, Mass.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Isbell-Porter Co., Newark, N. J.
Riter-Conley Company, Pittsburgh, Pa.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
The Gas Machinery Co., Cleveland, Ohio
The Stacey Manufacturing Co., Cincinnati, Ohio
The Stacey Bros. Gas Construction Co., Cincinnati, Ohio
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.

COOKING AUXILIARIES
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Duparquet, Huot & Moneuse Co., 108 W. 22nd St., New York, N. Y.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
The G. S. Blodgett Co., Burlington, Vt.
The General Gas Appliance Co., 103 Park Ave., New York, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Scott Gas Appliance Co., 1311 E. St., N. W., Washington, D. C.

COUPLINGS
S. R. Dresser Mfg. Co., Bradford, Pa.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

DECALCOMANIA PRODUCTS
The Meyercord Co., Inc., Chamber of Commerce Bldg., Chicago, Ill.

DISINFECTANTS
The Sherwin-Williams Co., Cleveland, O., New York, N. Y.

DYES, DISINFECTANTS, DRY COLORS
The Sherwin-Williams Co., Cleveland, Ohio, New York, N. Y.

ELECTRIC CONTROLLING DEVICES
The Cutler-Hammer Mfg. Co., Milwaukee, Wis.

ELEVATORS
Craig Ridgway & Son Co., Coatesville, Pa.
Phillips, Lang & Co., Chicago, Ill.

ENAMELS AND JAPANS (Heat Resisting)
The Sherwin-Williams Co., Cleveland, O., New York, N. Y.

EXCHANGERS (Heat)
The Bartlett Hayward Co., Baltimore, Md.
Riter-Conley Company, Pittsburgh, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.

EXPERT APPRAISAL
Steere Engineering Co., Detroit, Mich.
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.

EXTRACTORS (Tar, Dust, Fumes)
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Isbell-Porter Co., Newark, N. J.
The Bartlett Hayward Co., Baltimore, Md.
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.

FITTINGS
A-B Stove Co., Battle Creek, Mich.
Acme Brass Works, Detroit, Mich.
Aws Manufacturing Co., New York, N. Y.
Banner Iron Works, 4560 Shaw Ave., St. Louis, Mo.
Will W. Barnes, 31 Chelsea Place, East Orange, N. J.
Claus Automatic Gas Cock Co., Milwaukee, Wis.
Davis & Farnum Mfg. Co., Waltham, Mass.
S. R. Dresser Mfg. Co., Bradford, Pa.
Eriez Stove & Mfg. Co., Erie, Pa.
Grinnell Co., Inc., Providence, R. I.
Kitson Co., 2827 Oakford St., Philadelphia, Pa.
The McRae & Roberts Co., Detroit, Mich.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
Peninsular Brass Works, Detroit, Mich.
Shapiro & Aronson, Inc., 20 Warren St., New York, N. Y.
Standard Brass Works, Detroit, Mich.
The Gas Machinery Co., Cleveland, Ohio
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Roberts Brass Mfg. Co., Detroit, Mich.
The Western Gas Construction Co., Fort Wayne, Ind.
Welsbach Co., Gloucester, N. J.

FITTINGS (Malleable Iron)
Detroit Brass & Malleable Works, Detroit, Mich.

FLEXIBLE TUBING AND ENDS
Atlantic Tubing Co., Providence, R. I.
Bishop Gutta Percha Co., 420 E. 25th St., New York, N. Y.
Eastman Mfg. Co., Manitowoc, Wis.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.

FLASHLIGHTS AND BATTERIES
Will W. Barnes, 31 Chelsea Place, East Orange, N. J.
Diamond Electric Specialties Corp., Newark, N. J.
Novo Mfg. Co., 424 W. 33rd St., New York, N. Y.

FUEL BRIQUETTING
Foundation Oven Corporation, Woolworth Building, New York, N. Y.

FURNACES
American Gas Furnace Co., 24 John St., New York, N. Y.
Century Stove & Mfg. Co., Johnstown, Pa.
Eriez Stove & Mfg. Co., Erie, Pa.
Geist Mfg. Co., Atlantic City, N. J.
Charles A. Hones, Inc., Baldwin, Long Island, N. Y.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Maxon Furnace and Engineering Co., Muncie, Ind.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Needham Gas Appliance Co., Inc., 1 S. Lafayette St., New York.
Russell Engineering Co., St. Louis, Mo.
Tate-Jones & Co., Inc., 50 Church St., New York, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.
Monarch Engineering & Mfg. Co., American Bldg., Baltimore, Md.

GAS ENGINES
The Bartlett Hayward Co., Baltimore, Md.

GAS ENGINE COCKS AND VALVES
Standard Brass Works, Detroit, Mich.

GAS IRONS
A-B Stove Co., Battle Creek, Mich.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Milwaukee Gas Specialty Co., Milwaukee, Wis.
Benson Mfg. Co., Chicago, Ill.
Strause Gas Iron Co., Philadelphia, Pa.

GAS LOGS
The Mead Gas Heater Co., Delawanna, N. J.
Strait & Richards, Inc., Newark, N. J.

GAS MAIN BAGS AND GAS MAIN STOPPERS
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York City.

GAS MIXERS
American Gas Furnace Co., 24 John St., New York, N. Y.
Century Stove & Mfg. Co., Johnstown, Pa.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eriez Stove & Mfg. Co., Erie, Pa.
Geist Mfg. Co., Atlantic City, N. J.
Grinnell Co., Inc., Providence, R. I.
Hays Mfg. Co., Inc., Erie, Pa.
Improved Appliance Co., Inc., 419 Kent Ave., Brooklyn, N. Y.
Hale Manufacturing Co., Chicago, Ill.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Maxon Furnace & Engineering Co., Muncie, Ind.
Strait & Richards, Inc., Newark, N. J.
Tate-Jones & Co., Inc., 50 Church St., New York, N. Y.
The C. M. Kemp Mfg. Co., Baltimore, Md.
Monarch Engineering & Mfg. Co., American Bldg., Baltimore, Md.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.

GAS PLANTS (Blue)
Gas Engineering Co., Ingram Ave., Trenton, N. J.
The Bartlett Hayward Co., Baltimore, Md.
The Gas Machinery Co., Cleveland, Ohio
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.

GAS PLANTS (Carbureted Water)
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Gas Machinery Co., Cleveland, Ohio
The Bartlett Hayward Co., Baltimore, Md.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Stacey Manufacturing Co., Cincinnati, Ohio
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.

GAS PLANTS (Coal) (Engineers)
Davis & Farnum Mfg. Co., Waltham, Mass.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Isbell-Porter Co., Newark, N. J.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Riter-Conley Company, Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
Semet-Solvay Co., Syracuse, N. Y.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
The Gas Machinery Co., Cleveland, Ohio
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.
The Stacey Manufacturing Co., Cincinnati, Ohio
The Stacey Bros. Gas Construction Co., Cincinnati, Ohio
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.

GAS RANGE WATER HEATERS
Elliott Water Heater Co., Inc., 1246 Myrtle Ave., Brooklyn, N. Y.

GOVERNORS, PRESSURE VACUUM & PUMP
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York.
Plant Engineering & Equipment Co., Inc., 192 Broadway, New York, N. Y.

HEATERS (Room)
Century Stove & Mfg. Co., Johnstown, Pa.
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Eclipse Gas Stove Co., Rockford, Ill.
Eriez Stove & Mfg. Co., Erie, Pa.
Estate Stove Co., Hamilton, Ohio
Geist Mfg. Co., Atlantic City, N. J.
Grinnell Co., Inc., Providence, R. I.
General Gas Light Co., New York, N. Y., and Kalamazoo, Mich.
The J. H. Grayson Mfg. Co., Athens, Ohio
Hugo Manufacturing Co., West Duluth, Minn.
Illinois Specialty Mfg. Co., Bloomington, Ill.
Kidde & Co., 169 Chambers St., New York, N. Y.
Lawson Mfg. Co., Pittsburgh, Pa.
Masdon Mfg. Co., Cambridge, Mass.
New Process Stove Co. Div., Cleveland, Ohio
Reliable Stove Co. Div., Cleveland, Ohio
Reznor Mfg. Co., Mercer, Pa.
Roberts & Mander Stove Co., Philadelphia, Pa.
J. B. Slattery & Bro. Inc., 108-110 Lawrence St., Brooklyn, N. Y.
Strait & Richards, Inc., Newark, N. J.
The Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
The Mead Gas Heater Co., Delawanna, N. J.
The Ohio State Stove & Mfg. Co., Columbus, Ohio.
The Sanitary Heating Co., 233 37th St., Brooklyn, N. Y.
The Western Gas Construction Co., Fort Wayne, Ind.
The A. H. Wolff Gas Radiator Co., 4 Great Jones St., New York, N. Y.
Welsbach Co., Gloucester, N. J.

HEATERS (Garage)
Kidde & Co., 169 Chambers St., New York, N. Y.
Masdon Mfg. Co., Cambridge, Mass.

HEATERS (Pressing and Soldering Irons)
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eclipse Gas Stove Co., Rockford, Ill.
Estate Stove Co., Hamilton, Ohio
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Charles A. Hones, Inc., Baldwin, Long Island, N. Y.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Strait & Richards, Inc., Newark, N. J.
The Bryant Heater & Mfg. Co., Cleveland, Ohio
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.

HIGH PRESSURE SYSTEMS
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Grinnell Co., Inc., Providence, R. I.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
Needham Gas Appliance Co., Inc., 1 S. Lafayette St., New York City.
Selas Co., 521 W. 23d St., New York, N. Y.
The Gas Machinery Co., Cleveland, Ohio
The C. M. Kemp Mfg. Co., Baltimore, Md.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.

HOLDERS (Structural Steel Works))
Banner Iron Works, 4560 Shaw Ave., St. Louis, Mo.
Camden Iron Works, Camden, N. J.
Cruse-Kemper Co., Ambler, Pa.
Davis & Farnum Mfg. Co., Waltham, Mass.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Riter-Conley Company, Pittsburgh, Pa.
The Bartlett Hayward Co., Baltimore, Md.
The Stacey Bros. Gas Construction Co., Cincinnati, Ohio
The Stacey Manufacturing Co., Cincinnati, Ohio
The Western Gas Construction Co., Fort Wayne, Ind.

HOT PLATES
A-B Stove Co., Battle Creek, Mich.
Century Stove & Mfg. Co., Johnstown, Pa.
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Eclipse Gas Stove Co., Rockford, Ill.
Eriez Stove & Mfg. Co., Erie, Pa.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Rathbone, Sard & Co., Albany, N. Y.
J. B. Slattery & Bro., Inc., 108-110 Lawrence St., Brooklyn, N. Y.
The Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
The Eclipse Stove Co., Mansfield, Ohio
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Michigan Stove Co., Detroit, Mich.
The A. H. Wolff Gas Radiator Co., 4 Great Jones St., New York, N. Y.
The Ohio State Stove & Mfg. Co., Columbus, Ohio
Union Stove Works, 20 Beekman St., New York, N. Y.
Weir Stove Co., Taunton, Mass.

IRONING MACHINES
American Ironing Machine Co., 168 N. Michigan Ave., Chicago, Ill.
Barnett Foundry & Machine Co., Lyons Ave., Irvington, N. J.

INCINERATORS
Estate Stove Co., Hamilton, Ohio
Odorless Incinerator Co., Philadelphia, Pa.
Ruud Mfg. Co., Pittsburgh, Pa.

INSTRUMENTS (Measuring, Testing and Recording)
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, Ohio
The Brown Instrument Co., Phila., Pa.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Equitable Meter Co., Pittsburgh, Pa.
D. McDonald & Co., Albany, N. Y.
Maryland Meter Works, Baltimore, Md.
Precision Instrument Co., 21 Halsey St., Newark, N. J.
Republic Flow Meters Co., 563 Washington Blvd., Chicago, Ill.
Steere Engineering Co., Detroit, Mich.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
The Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.

INSULATING MATERIALS
Celite Products Co., 11 Broadway, New York, N. Y.
Davis & Farnum Mfg. Co., Waltham, Mass.

KILNS (For Firing Glass, China and Pottery)
B. F. Drakenfeld & Co., Inc., 50 Murray St., New York, N. Y.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Russell Engineering Co., St. Louis, Mo.

The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.

LIGHTERS (Ranges)
Claus Automatic Gas Cock Co., Milwaukee, Wis.
Will W. Barnes, East Orange, N. J.
Milwaukee Gas Specialty Co., Milwaukee, Wis.
J. M. Sherwood Co., New York, N. Y.
Strauss Gas Iron Co., Philadelphia, Pa.
The Michigan Stove Co., Detroit, Mich.
Welsbach Co., Gloucester, N. J.

LIGHTING (Fixtures)
Will W. Barnes, 31 Chelsea Place, East Orange, N. J.
Shapiro & Aronson, Inc., 20 Warren St., New
Salem Brothers, 122 Centre St., New York, N. Y. York, N. Y.
Welsbach Co., Gloucester, N. J.

LIGHTING (Gas Domes, Portables, etc.)
Will W. Barnes, 31 Chelsea Place, East Orange, N. J.
Kramer Bros. Lamp Co., 585 Broadway, New York, N. Y.
Royal Art Glass Co., 243 Canal St., New York, N. Y.
Shapiro & Aronson, Inc., 20 Warren St., New York, N. Y.
Salem Brothers, 122 Centre St., New York, N. Y.
Welsbach Co., Gloucester, N. J.

LIGHTING (Glassware)
Shapiro & Aronson, Inc., 20 Warren St., New York, N. Y.
Salem Brothers, 122 Centre St., New York, N. Y.
Welsbach Co., Gloucester, N. J.

LIGHTING (Incidentals)
Storrs Mica Co., Owego, N. Y.

LIGHTING (Mantles)
General Gas Light Co., New York, N. Y., and Kalamazoo, Mich.
Welsbach Co., Gloucester, N. J.

METAL RECEPTACLES
American Gas Furnace Co., 24 John St., New York, N. Y.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Charles A. Hones, Inc., Baldwin, Long Island, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.
United Lead Co., 111 Broadway, New York, N. Y.

METERS
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, Ohio
Cleveland Gas Meter Co., Cleveland, Ohio
Equitable Meter Co., Pittsburgh, Pa.
John J. Griffin & Co., 1521 Race St., Philadelphia, Pa.
Helme & McIlhenny, 1349 Cherry St., Philadelphia, Pa.
D. McDonald & Co., Albany, N. Y.
Maryland Meter Works, Baltimore, Md.
Metric Metal Works, Erie, Pa.
Pittsburgh Meter Co., East Pittsburgh, Pa.
Precision Instrument Co., 21 Halsey St., Newark, N. J.
Republic Flow Meters Co., 56 S. Washington Blvd., Chicago, Ill.
Rotary Meter Co., 52 Vanderbilt Ave., New York, N. Y.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
The Cutler-Hammer Mfg. Co., Milwaukee, Wis.
The Sprague Meter Co., Bridgeport, Conn.
Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.

METERS (Air and Steam)
Pittsburgh Meter Co., East Pittsburgh, Pa.
Republic Flow Meters Co., 565 Washington Blvd., Chicago, Ill.
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.

METER CONNECTIONS, SEALS, Etc.
Cleveland Gas Meter Co., Cleveland, Ohio
S. R. Dresser Mfg. Co., Bradford, Pa.
Equitable Meter Co., Pittsburgh, Pa.
Helme & McIlhenny, 1349 Cherry St., Philadelphia, Pa.
D. McDonald & Co., Albany, N. Y.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
The Lattimer Stevens Co., Columbus, Ohio
The Sprague Meter Co., Bridgeport, Conn.
Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.
Pittsburgh Meter Co., East Pittsburgh, Pa.

METERS (Steam, Condensation, Oil, Hot and Cold Water)
Pittsburgh Meter Co., Gasoline, East Pittsburgh, Pa.
Plant Engineering & Equipment Co., Inc., 192 Broadway, New York, N. Y.
Republic Flow Meters Co., 56 S. Washington Blvd., Chicago, Ill.

METER PROVERS
Equitable Meter Co., Pittsburgh, Pa.
John J. Griffin & Co., Philadelphia, Pa.
Helme & McIlhenny, 1349 Cherry St., Philadelphia, Pa.
D. McDonald & Co., Albany, N. Y.
Maryland Meter Works, Baltimore, Md.
Pittsburgh Meter Co., East Pittsburgh, Pa.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.

METER SHELF
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.

OFFICE LABOR SAVING DEVICES
Addressograph Co., Chicago, Ill.
Burroughs Adding Machine Co., Detroit Mich.
Elliott-Fisher Co., Harrisburg, Pa.
Kalamazoo Loose-Leaf Binder Co., Kalamazoo, Mich.
Library Bureau, Boston, Mass.
Monroe Calculating Machine Co., Woolworth Bldg., New York, N. Y.
Remington Typewriter Co., 374 Broadway, New York.
Underwood Typewriter Co., Vesey St., New York, N. Y.

OIL (Diaphragm)
John J. Griffin & Co., 1521 Race St., Philadelphia, Pa.
Superior Meter Co., Brooklyn, N. Y.

OVENS (Baking and Cooking)
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eclipse Gas Stove Co., Rockford, Ill.
Famous Oven Manufacturing Co., 110 W. 42nd S., New York, N. Y.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Grinnell Co., Inc., Providence, R. I.
Meek Oven Mfg. Co., 18 W. 34th St., New York, N. Y.
E. E. Steiner & Co., Inc., 20 Orange St., Newark, N. J.

The G. S. Blodgett Co., Burlington, Vt.
The Crandall-Pettee Co., Hudson St., New York, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Ohio State Stove & Mfg. Co., Columbus, Ohio
The Union Steel Products Co., Ltd., Albion, Mich.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.

OVENS (Annealing, Japanning, Drying, Core, etc.)

Famous Oven Manufacturing Co., 110 W. 42nd St., New York, N. Y.
Gehnrich Indirect Heat Oven Co., Inc., 62 Franklin Ave., Brooklyn, N. Y.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Grinnell Co., Inc., Providence, R. I.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Meek Oven Mfg. Co., 18 W. 34th St., New York, N. Y.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
E. E. Steiner & Co., Inc., 20 Orange St., Newark, N. J.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The C. M. Kemp Mfg. Co., Baltimore, Md.
Monarch Engineering & Mfg. Co., American Bldg., Baltimore, Md.
The Surface Combustion Co., 366 Gerard Ave., New York, N. Y.
The Union Steel Products Co., Ltd., Albion, Mich.
Young Bros. Co., Detroit, Mich.

OVENS (Warming)

Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eclipse Gas Stove Co., Rockford, Ill.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Meek Oven Mfg. Co., 18 W. 34th St., New York, N. Y.
The G. S. Blodgett Co., Burlington, Vt.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Union Steel Products Co., Ltd., Albion, Mich.

PAINTS (Metal Protective, Gas Holder, Acid Resisting, Coal Tar Pitch, Gas Resisting, Marine)

The Sherwin-Williams Co., Cleveland, Ohio, New York, N. Y.

PHOTOMETERS

Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
D. McDonald & Co., Albany, N. Y.
Maryland Meter Works, Baltimore, Md.
Nathaniel Tufts Meter Works, Boston, Mass.

PIPE

Davis & Farnum Mfg. Co., Waltham, Mass.
Grinnell Co., Inc., Providence, R. I.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Riter-Conley Co., Pittsburgh, Pa.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
United Lead Co., 111 Broadway, New York, N. Y.

PIPE CASTINGS AND SPECIALS

Banner Iron Works, 4560 Shaw Ave., St. Louis, Mo.
Davis & Farnum Mfg. Co., Waltham, Mass.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Isbell-Porter Co., Newark, N. J.
Gas Engineering Co., Ingram Ave., Newark, N. J.
The Bartlett Hayward Co., Baltimore, Md.
The Stacey Manufacturing Co., Cincinnati, Ohio
The Western Gas Construction Co., Fort Wayne, Ind.

PIPE CLAMPS AND SLEEVES

Davis & Farnum Mfg. Co., Waltham, Mass.
S. R. Dresser Mfg. Co., Bradford, Pa.
National Machine Works, Sheffield & North Aves., Chicago, Ill.

PIPE PACKING

Celite Products Co., 11 Broadway, New York, N. Y.
Grinnell Co., Inc., Providence, R. I.
United Lead Co., 111 Broadway, New York, N. Y.

PIPE TOOLS (Caulking, Cutting, Tapping)

Grinnell Co., Inc., Providence, R. I.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
United Lead Co., 111 Broadway, New York, N. Y.

PLATE WARMERS

Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Duparquet, Huot & Moneuse Co., 108 W. 22nd St., New York, N. Y.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
The Improved Appliance Co., 419 Kent Ave. Brooklyn, N. Y.

PORCELAIN ENAMEL PARTS (Stoves, Lamps, Linings, Stamping and Spinnings)

Baltimore Enamel & Novelty Co., Baltimore, Md.
Eclipse Gas Stove Co., Rockford, Ill.
The Enamel Products Co., Cleveland, Ohio
The Porcelain Enamel & Mfg. Co., Baltimore, Md.
The Union Steel Products Co., Ltd., Albion, Mich.

PORCELAIN ENAMEL PLANTS (Installers)

The Porcelain Enamel & Mfg. Co., Baltimore, Md.

PRESSURE GAUGES

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Equitable Meter Co., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.
D. McDonald & Co., Albany, N. Y.
Maryland Meter Works, Baltimore, Md.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
The Brown Instrument Co., Phila., Pa.
The Bryant Heater & Mfg. Co., Cleveland, Ohio
The Gas Machinery Co., Cleveland, Ohio
The Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
The Western Gas Construction Co., Fort Wayne, Ind.
Nathaniel Tufts Meter Works, Boston, Mass.

PRESSURE GAUGES (Boiler, Naphtha, Oil, Steam. Tar)

M. T. Davidson Co., 154 Nassau St., New York, N. Y.

PUMPING ENGINES

PUMPS

M. T. Davidson Co., 154 Nassau St., New York, N. Y.
Gas Machinery Co., Cleveland, Ohio
Nathaniel Tufts Meter Works, Boston, Mass.
Plant Engineering & Equipment Co., Inc., 192 Broadway, New York, N. Y. (Centrifugal, Reciprocating & Sump).
Superior Meter Co., Brooklyn, N. Y.
The Western Gas Construction Co., Fort Wayne, Ind.
L. J. Wing Mfg. Co., 362 West 13th St., New York, N. Y.

PURIFIERS

Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Cruse-Kemper Co., Ambler, Pa.
Davis & Farnum Mfg. Co., Waltham, Mass.
Gas Engineering Co., Ingram Ave., Newark, N. J.
Gas Machinery Co., Cleveland, Ohio
Isbell-Porter Co., Newark, N. J.
Riter-Conley Co., Pittsburgh, Pa.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Stacey Bros. Gas Construction Co., Cincinnati, Ohio
The Stacey Manufacturing Co., Cincinnati, Ohio
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.

PURIFYING MATERIALS

Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Eph Lyon, Trust Company Bldg., Franklin, Pa.
Gas Purifying Materials Co., Long Island City, N. Y.
J. F. Henderson Co., 1707 Commonwealth Bldg., Pittsburgh, Pa.
Iron Hydroxide Co., Paschall Station, Philadelphia, Pa.

PYROMETERS

The Brown Instrument Co., Phila., Pa.

RADIATORS

American Gas Appliance Co., 108 Lawrence St., Brooklyn, N. Y.
Cabco Sales Co., Gowanda, N. Y.
James B. Clow & Sons, Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eriez Stove & Mfg. Co., Erie, Pa.
Grinnell Co., Inc., Providence, R. I.
Hugo Manufacturing Co., West Duluth, Minn.
Kidde & Co., 169 Chambers St., New York, N. Y.
J. B. Slattery & Bro., Inc., 108-110 Lawrence St., Brooklyn, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Mead Gas Heater Co., Delawanna, N. J.
The A. H. Wolff Gas Radiator Co., 4 Great Jones St., New York, N. Y.

RANGES (Domestic)

A-B Stove Co., Battle Creek, Mich.
Century Stove & Mfg. Co., Johnstown, Pa.
Geo. M. Clark & Co. Div., Chicago, Ill.
Chambers Manufacturing Co., Shelbyville, Ind.—(Fireless type)
Bartlett & Co., Inc., Philadelphia, Pa.
Comstock-Castle Stove Co., Quincy, Ill.
Abram Cox Stove Co., Philadelphia, Pa.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Dangler Stove Co. Div., Cleveland, Ohio
Eclipse Gas Stove Co. Div., Rockford, Ill.
Eriez Stove & Mfg. Co., Erie, Pa.
Estate Stove Co., Hamilton, Ohio
Gribben & Sexton Co., Chicago, Ill.
National Stove Co. Div., Lorain, Ohio
New Process Stove Co. Div., Cleveland, Ohio
Quick Meal Stove Co. Div., St. Louis, Mo.
Rathbone, Sard & Co., Albany, N. Y.
Reliable Stove Co. Div., Cleveland, Ohio
Roberts & Mander Stove Co., Philadelphia, Pa.
Scott Gas Appliance Mfg. Co., Commercial House, Pottstown, Pa.
J. M. Sherwood Co., New York, N. Y.
The Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
The Champion Stove Co., Cleveland, Ohio
The Eclipse Stove Co., Mansfield, Ohio
The General Gas Appliance Co., 103 Park Ave., New York, N. Y.
The Michigan Stove Co., Detroit, Mich.
The Ohio State Stove & Mfg. Co., Columbus, Ohio
The Trenkamp Stove & Mfg. Co., Cleveland, O.
The Peninsular Stove Co., Detroit, Mich.
The A. H. Wolff Gas Radiator Co., 4 Great Jones St., New York, N. Y.
Union Stove Works, 70 Beekman St., New York, N. Y.
Vesta Gas Range & Mfg. Co., Chattanooga, Tenn.
Walker & Pratt Mfg. Co., Boston, Mass.
Weir Stove Co., Taunton, Mass.

RANGES (Hotel)

Geo. M. Clark & Co. Div., Chicago, Ill.
Comstock-Castle Stove Co., Quincy, Ill.
Abram Cox Stove Co., Philadelphia, Pa.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Duparquet, Huot & Moneuse Co., 108 W. 22nd St., New York, N. Y.
Eclipse Gas Stove Co. Div., Rockford, Ill.
Estate Stove Co., Hamilton, Ohio
The General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Roberts & Mander Stove Co., Philadelphia, Pa.
The Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
The Michigan Stove Co., Detroit, Mich.

REFRACTORY MATERIALS

J. H. Gautier & Co., Jersey City, N. J.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Quigley Furnace Specialties Co., 26 Cortlandt St., New York, N. Y.
Laclede-Christy Clay Products Co., St. Louis, Mo.
Mount Union Refractories Co., Mount Union, Pa.
Riter-Conley Co., Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
G. F. Schmidt, Chicago, Ill.
Tate-Jones & Co., Inc., 50 Church St., New York, N. Y.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
Monarch Engineering & Mfg. Co., American Bldg., Baltimore, Md.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.

REGULATORS (Governors)

Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Equitable Meter Co., Pittsburgh, Pa.
Gas Machinery Co., Cleveland, Ohio
Isbell-Porter Co., Newark, N. J.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Reynolds Gas Regulator Co., Anderson, Ind.
Steere Engineering Co., Detroit, Mich.
The Brown Instrument Co., Philadelphia, Pa.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Sprague Meter Co., Bridgeport, Conn.
The Western Gas Construction Co., Fort Wayne, Ind.
L. J. Wing Mfg. Co., 362 West 13th St., New York, N. Y.

REDUCING VALVES (Gas, Air, Steam, Water)

Plant Engineering & Equipment Co., Inc., 192 Broadway, New York City.

REPAIRS (Gas Meters and Appliances)

Helme & McIlhenny, 1349 Cherry St., Philadelphia, Pa.
Maryland Meter Works, Baltimore, Md.
Superior Meter Co., Brooklyn, N. Y.
The Western Gas Construction Co., Fort Wayne, Ind.

RETORTS

Gas Machinery Co., Cleveland, Ohio
J. H. Gautier & Co., Jersey City, N. J.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
Riter-Conley Co., Pittsburgh, Pa.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.
The West Gas Improvement Co. of America, 150 Nassau St., New York, N. Y.

ROOF CEMENTS
The Sherwin-Williams Co., Cleveland, Ohio, New York, N. Y.

RUST PREVENTIVE
Superior Laboratories, Grand Rapids, Mich.

SCRUBBERS
Davis & Farnum Mfg. Co., Waltham, Mass.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Foundation Oven Corporation, Woolworth Building, New York, N. Y.
Gas Machinery Co., Cleveland, Ohio
Isbell-Porter Co., Newark, N. J.
Riter-Conley Co., Pittsburgh, Pa.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Koppers Co., Pittsburgh, Pa.
The Stacey Bros. Gas Construction Co., Cincinnati, Ohio
The Stacey Manufacturing Co., Cincinnati, Ohio
The U. G. I. Contracting Co., Broad & Arch Sts., Philadelphia, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.

SELLING AGENTS

SEPARATORS (Oil and Steam)
Plant Engineering & Equipment Co., Inc., 192 Broadway, New York City.

SERVICE BOXES, CLAMPS, Etc.
Davis & Farnum Mfg. Co., Waltham, Mass.
Grinnell Co., Inc., Providence, R. I.
Hays Mfg. Co., Inc., Erie, Pa.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.

SOAPS (Industrial)
The Sherwin-Williams Co., Cleveland, O., New York, N. Y.

SPECIALS—CAST IRON
The Western Gas Construction Co., Fort Wayne, Ind.

STEAM TRAPS
Plant Engineering & Equipment Co., Inc., (Corliss Valve) 192 Broadway, New York, N. Y.

STILLS (Benzol, Toluol)
Foundation Oven Corporation, Woolworth Building, New York, N. Y.
The Bartlett Hayward Co., Baltimore, Md.
The Koppers Co., Pittsburgh, Pa.
The Western Gas Construction Co., Fort Wayne, Ind.

STOVES (Confectioners, Laundry, Tailor)
A-B Stove Co., Battle Creek, Mich.
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
The General Gas Appliance Co., 103 Park Ave., Brooklyn, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.

STRAINERS (Gas, Air, Steam, Water)
Plant Engineering & Equipment Co., Inc., 192 Broadway, New York, N. Y.

STRUCTURAL STEEL WORKS (See Holders)

TANKS (Ammonia, Oil, Water)
Cruse-Kemper Co., Ambler, Pa.
Davis & Farnum Mfg. Co., Waltham, Mass.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Gas Machinery Co., Cleveland, Ohio
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Riter-Conley Co., Pittsburgh, Pa.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Stacey Bros. Gas Construction Co., Cincinnati, Ohio
The Stacey Manufacturing Co., Cincinnati, Ohio
The Western Gas Construction Co., Fort Wayne, Ind.

TAR DEHYDRATION
The Sharples Specialty Co., New York, N. Y.

THERMOMETERS
Brown Instrument Co., Philadelphia, Pa.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Gas Machinery Co., Cleveland, Ohio
Grinnell Co., Inc., Providence, R. I.
Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
Gas Instrument Co., Ingram Ave., Trenton, N. J.
The Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
The Western Gas Construction Co., Fort Wayne, Ind.

THERMOSTATS
Brown Instrument Co., Philadelphia, Pa.
Gas Machinery Co., Cleveland, Ohio
Kidde & Co., 169 Chambers St., New York, N. Y.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
B. Ryan & Co., 372 W. 15th St., New York, N. Y.
The Bryant Heater & Mfg. Co., Cleveland, Ohio
The H. A. Wilson Co., 97 Chestnut St., Newark, N. J.

THERMO VALVES
Brown Instrument Co., Philadelphia, Pa.
Pittsburgh Water Heater Co., Pittsburgh, Pa.
Robertshaw Mfg. Co., Youngwood, Pa.

THORIUM
Welsbach Co., Gloucester, N. J.

TRENCH WORK
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.

TURBINE (Steam)
L. J. Wing Mfg. Co., 362 West 13th St., New York, N. Y.

VALVES
Claus Automatic Gas Cock Co., Milwaukee, Wis.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Gas Machinery Co., Cleveland, Ohio
Grinnell Co., Inc., Providence, R. I.
Isbell-Porter Co., Newark, N. J.
Plant Engineering & Equipment Co., Inc., 192 Broadway, New York, N. Y.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
The Bryant Heater & Mfg. Co., Cleveland, Ohio
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Stacey Manufacturing Co., Cincinnati, Ohio
The Western Gas Construction Co., Fort Wayne, Ind.

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AMERICAN GAS ASSOCIATION, Inc.

Current List No. 42—January, 1921

Where information is not secured from company receiving increase, the source of information is noted in brackets. See Cumulative List No. 6, of September, 1920, for explanation of abbreviations. This list includes only increases reported as secured subsequent to December, 1920.

ALABAMA

Anniston: Power Co. reports increase effective Feb. 1, 1920. New rate: $1.60 gross, $1.50 net per MCF. Old rate: 50¢ less. Increase agreed to by City Council.

ARIZONA

Globe: Lt. & Power Co. reports increase effective Oct. 1, 1920. New rate: 400 c. f. or less $1.00—1st 5 MCF $2.50—next 5 MCF $2.25—next 5 MCF $2.00—over 15 MCF $1.75 per M. Old rate: 500 c. f. or less $1.00—1st 10 MCF $2.00—next 10 MCF $1.80—over 20 MCF $1.50 per M.

Prescott: G. & E. Co. reports old rate $2.00 per MCF. First increase effective Apr. 18, 1920. New rate: 1st MCF $2.40—over 1 MCF $1.40 per M. Second increase effective Oct. 9, 1920: 1st MCF $2.50—over 1 MCF $1.50 per M. Third increase effective Dec. 1, 1920: 1st MCF $2.60—over 1 MCF $1.60 per M. Rate governed in part by price of Fuel Oil $2.60 based on Fuel Oil at $3.58, with barrel and including freight 5¢ per MCF increase or decrease, according to increase or decrease of Fuel Oil above $2.80 per barrel.

CALIFORNIA

Monterey: Coast Valley G. & E. Co. reports increase effective Feb. 25, 1920. New rate: 500 c. f. or less $1.00—next 2 MCF $1.75—next 25 CCF $1.50—next 5 MCF $1.30—next 5 MCF $1.10—over 15 MCF $1.00 per M. Old rate: 1st 500 c. f. or less $1.00—next 25 CCF $1.50—next 7 MCF $1.25—next 15 MCF $1.00—over 25 MCF 90¢ per M. Supplies Pacific Grove, rates the same throughout.

Salinas: Coast Valley G. & E. Co. reports increase effective Feb. 25, 1920. New rate: 1st 500 c. f. or less $1.00—next 2 MCF $1.90—next 25 CCF $1.75—next 5 MCF $1.50—next 5 MCF $1.30—over 15 MCF $1.10 per M. Old rate: 1st 500 c. f. $1.00—next 25 CCF $1.60—next 7 MCF $1.30—next 15 MCF $1.10—over 25 MCF $1.00 per M.

COLORADO

Grand Junction: Elec. Gas & Mfg. Co. reports increase Sept. 1, 1919, from $1.25 to $1.50 per MCF—disc. 5% prompt payment. M. M. Chge. 75¢.

Trinidad: Electric Trans. Ry. & Gas Co. reports increase effective Apr. 1, 1919. New rate: $1.60 per MCF—10¢ per M disc. 7 days. M. M. Chge. $1.00. Old rate: lighting $1.70 per M—disc. 10¢ per M 7 days. Fuel $1.10 net. Comb. $1.40 net per M. M. M. Chge. $1.00.

CONNECTICUT

Putnam: Lt. & Power Co. reports increase effective Aug. 20, 1920. New rate: 1st 10 MCF $2.00—over 10 MCF $1.60 per M—disc. 10¢ per M 15 days. S. Chge. 50¢ per meter per month. Old rate: 1st 50 MCF $1.70—over 50 MCF $1.60 per M—disc. 10¢ per M 10 days. M. M. Chge. 25¢.

DELAWARE

Georgetown: Gas Co. reports increase effective July 1, 1920. Old rate: $1.95 gross, $1.85 net per MCF. M. M. Chge. 50¢. New rate: $2.70 gross, $2.50 net per MCF. M. M. Chge. $1.00.

FLORIDA

Jacksonville: Gas Co. reports increase effective Aug. 1, 1920. New rate: $1.85 gross, $1.75 net per MCF. M. M. Chge. $1.00. Old rate: $1.60 gross, $1.50 net per MCF. M. M. Chge. same.

Orlando: Water & Lt. Co. reports increase effective Sept. 1, 1920. Old rate: 1st MCF 25¢ per CCF—next 4 MCF 22 1/5¢—next 5 MCF 20¢—next 10 MCF 17½¢—over 20 MCF 16½¢ per C. M. M. Chge. $1.00 per month. P. P. Meters 25¢. New rate: Dom. 1st 5 MCF 25¢—over 5 MCF 20¢ per CCF—M. M. Chge. $1.00. Ind. 1st 10 MCF 20¢—over 10 MCF 17½¢ per CCF—M. M. Chge. $10.00.

St. Petersburg: Municipal Co. reports increase effective Oct. 1, 1920. New rate: 1st 5 MCF $1.60—next 5 MCF $1.50—next 10 MCF $1.40—next 20 MCF $1.30—over 40 MCF special rate. Old rate: 25¢ less each step.

GEORGIA

Albany: Municipal Plant reports increase. Old rate: $1.35 to $1.10 per MCF—disc. 10%. New rate: 1st 10 MCF $1.50—next 20 MCF $1.40—next 20 MCF $1.30—over 50 MCF $1.20 per M—disc. 10% 10 days.

Waycross: Consumers Gas & Coke Co. reports Old rate: $1.40 gross, $1.30 net per MCF. First increase effective Sept. 1, 1918. New rate: $1.50 gross, $1.40 net per MCF. Second increase effective July 1, 1919. New rate: $1.80 gross, $1.70 net per MCF. Third increase effective Sept. 1, 1920. New rate: $2.10 gross, $2.00 net per MCF.

IDAHO

Lewiston: Co. reports second increase effective Sept. 23, 1920. New rate: 1st CCF $1.70 increasing 10¢ each CCF to $2.50, 9 CCF—disc. 10¢ per C 10 days—1st MCF $2.60—next MCF $2.45—next MCF $2.30—next MCF $2.15—next MCF $2.00—next 5 MCF $1.60—over 10 MCF $1.10 per M—disc. 10¢ per M 10 days. M. M. Chge. $1.75 per month or fraction thereof.

ILLINOIS

Canton: Co. reports fourth increase effective Nov. 1, 1920. New rate: 1st 2 MCF $1.90—next 3 MCF $1.80—next 5 MCF $1.65—over 10 MCF $1.45 per M—disc. 10¢ per M 10 days. M. M. Chge. 75¢ net per meter per month. P. P. Meters $1.85 net per M.

East St. Louis: St. Clair Co. G. & E. Co. reports increase effective Nov. 1, 1920. New rate: 1st 10 MCF $1.40 gross, $1.30 net—next 20 MCF $1.30 gross, $1.20 net—next 20 MCF $1.10—next 50 MCF $1.00—next 100 MCF 95¢—over 200 MCF 90¢ per M net. M. M. Chge. 50¢ per month. P. P. Meters $1.35 per M. Supplies also Belleville.

Kewanee: Co. reports third increase effective July 1, 1920. New rate: 1st MCF $1.70—next 4 MCF $1.65—next 10 MCF $1.55—next 15 MCF $1.50—over 30 MCF $1.20 per M—disc. 10¢ per M.

Peoria: Co. reports second increase effective Nov. 20, 1920. New rate: 1st 10 MCF $1.30—next 10 MCF $1.25—next 30 MCF $1.20—next 50 MCF $1.15—next 300 MCF $1.05—over 400 MCF $1.00 per M—disc. 10¢ per M. M. M. Chge. 25¢.

Savanna: Peoples G. & E. Co. reports increase effective Nov. 1, 1920. New rate: $2.00 net per MCF. Old rate: $1.70 net per MCF. All P. P. Meters.

Springfield: Co. reports second increase effective Jan. 1, 1921. New rate: 1st 10 MCF $1.50, next 10 MCF $1.45, next 30 MCF $1.40, next 150 MCF $1.35, over 200 MCF $1.30 per M. Disc. 10¢ per M. M. M. Chge. 50¢ per meter per month.

Waukegan: Co. reports third increase effective Dec. 1, 1920. New rate: 1st 300 c. f. or less 50¢ net—1st 5 MCF $1.60—next 5 MCF $1.55—next 10 MCF $1.50—next 10 MCF $1.45—over 30 MCF $1.35 per M—disc. 10¢ per M. Increase granted pending final decision based on valuation for rate making.

West Hammond: G. & E. Co. reports increase effective Dec. 1, 1920. New rate: 1st 30 MCF $1.40—next 20 MCF $1.30—next 25 MCF $1.20—over 75 MCF $1.10 per M—disc. 10¢ per M 15 days. M. M. Chge. 75¢ per month. Old rate: $1.10 gross, $1.00 net per M.

INDIANA

Bluffton: Co. reports third increase effective Dec. 1, 1920. New rate: $1.85 per MCF—disc. 10¢ per M 10 days. M. M. Chge. $1.10, same disc.

Decatur: Co. reports third increase effective Dec. 1, 1920. New rate: $1.85 per MCF—disc. 10¢ per M 10 days. M. M. Chge. $1.10, same disc.

Fort Wayne: Co. reports fourth increase effective Nov. 29, 1920. New rate: 1st 10 MCF $1.35—next 20 MCF $1.25—next 20 MCF $1.15—next 150 MCF $1.05—over 200 MCF 75¢ per M. M. M. Chge. $1.00 per meter per month.

Coal and Oil Clause: The rate fixed herein for material consumption of gas in excess of 200,000 cubic feet per month is predicated upon an average price of $.07 per gallon for gas oil f. o. b. the plant, and the average price of $9.00 per ton on coke f. o. b. the plant, and the said rate of $.75 shall be subject to the two following adjustments monthly:

(1) By being increased or lowered in an amount equal to $.01 per 1,000 cubic feet for each $.003 (or fractional part thereof) variation in the price per gallon of gas oil f. o. b. plant as is used during the month.

(2) By being increased or lowered in amount equal to $.01 per 1,000 cubic feet sold (on consumption over 200,000 cubic feet per month) for each $.60 per ton variation of coke from a base price of $9.00 per ton. Details of the Oil Clause remain as shown in Cumulative List No. 6.

Terre Haute: Citizens Gas & Fuel Co. reports increase effective Jan. 1, 1921. New rate: 1st 3 MCF 95¢, next 7 MCF 85¢, next 10 MCF 75¢, over 20 MCF 65¢ per M. Old rate: 15¢ less per M. Rate pending valuation.

Washington: Water Lt. & Power Co. reports increase effective Apr. 1, 1920. New rate: $1.75 gross, $1.65 net per MCF. Old rate: $1.50 gross, $1.40 net per M.

IOWA

Centerville: Iowa Southern Utilities Co. reports increase effective May 1, 1920. New rate: $1.75 gross, $1.65 net per MCF. Old rate: MCF $1.50 gross, $1.40 net per MCF.

Des Moines: Co. reports third increase effective Nov. 1, 1920. New rate: $1.60 per MCF—disc. 10¢ per M 10 days.

Fort Madison: Gas Lt. Co. reports increase effective June 1, 1920, renewed from Jan. 1, 1921, for 6 months. New rate: 1st 5 MCF $2.05—over 5 MCF $1.85 per M—disc. 20¢ per M. Old rate: 20¢ per MCF less.

Hampton: Gas Co. reports increase effective Sept. 1, 1920. New rate: $2.20 gross, $2.10 net per MCF. Old rate: $1.85 gross, $1.75 net per MCF.

Marshalltown: Iowa Ry. & Lt. Co. reports increase effective Oct. 13, 1920. New rate: 1st 5 MCF $1.90—next 5 MCF $1.80—next 10 MCF $1.70—next 20 MCF $1.60—next 40 MCF $1.50—over 80 MCF $1.40 per M—penalty 10¢ per M 10 days. Old rate: 50¢ per MCF less each step.

Mt. Pleasant: Iowa G. & E. Co. reports increase effective Oct. 1, 1920. New rate: $3.00 per MCF—penalty 10¢ per M 10 days. M. M. Chge. 50¢. Old rate: $2.10 gross, $2.00 net per MCF. M. M. Chge. 25¢ per month. City Council refused to act. Notice given each consumer and rate put in effect.

Osceola: Southern Iowa Electric Co. reports increase effective Sept. 1, 1920. Old rate: $1.65 gross, $1.50 net per MCF. Increase effective Nov. 1, 1918: $2.15 gross, $2.10 net per MCF. Second increase effective Sept. 1, 1920. New rate: $2.55 gross, $2.50 net per MCF.

West Burlington: Co. reports increase effective Nov. 1, 1920. New rate: $1.60 per MCF—disc. 10¢ per M 20 days. M. M. Chge. 75¢ per meter per month.

MARYLAND

Hyattsville: G. & E. Co. reports increase effective Oct. 1, 1920. New rate: 1st 10 MCF $2.00—over 10 MCF $1.75 per MCF. R. T. S. Chge. 50¢ per meter per month. Old rate: 1st 10 MCF $1.75—over 10 MCF $1.00 per MCF.

MASSACHUSETTS

Blackstone: Electric Light Co. reports increase effective Dec. 1, 1920. New rate: $1.80 gross, $1.70 net per MCF—disc. 10¢ per M. R. T. S. Chge. 75¢ per meter per month. Old rate 10¢ less per M—disc. same. R. T. S. Chge. 25¢ less.

Boston: Co. reports fifth increase effective Jan. 4, 1921. New rate: $1.40 net per MCF.

Middleboro: G. & E. Plant reports increase effective Oct. 1, 1920. New rate: 1st CCF 51¢ per C—next 4 CCF 26¢—next 5 MCF 23¢—next 40 CCF 21¢—over 50 CCF 20¢ per C—disc. 1¢ per CCF prompt pay. Old rate: $1.75 per MCF—disc. 5¢ per M prompt pay.

New Bedford: Co. reports fifth increase effective Dec. 1, 1920. New rate: $1.60 gross, $1.50 net per MCF.

MICHIGAN

Alma: Gratiot County Gas Co. reports Old rate: $1.35 gross, $1.25 net per MCF. First increase Aug. 1, 1919. New rate: $1.55 gross, $1.45 net per MCF. Second increase effective Aug. 1, 1920. New rate: $2.00 gross, $1.90 net per MCF.

Dowagiac: Lt. & Power Co. reports increase effective July 1, 1920. New rate: 1st 10 MCF $2.00—over 10 MCF $1.70 per M—disc. 10% prompt pay. M. M. Chge. 75¢. Old rate: 1st 10 MCF $1.50—over 10 MCF $1.00 per M—disc. 10% prompt pay.

MINNESOTA

Crookstton: Gas Co. reports increase effective Oct. 1, 1920. New rate: $2.25 gross, $2.15 net per MCF 15 days. M. M. Chge. $1.00. Old rate: $1.90 gross, $1.80 net. Charge. 25¢.

St. Paul: Gas Light Co. reports increase effective Dec. 15, 1920. New rate: $1.00 net per MCF. Old rate: 1st 50 MCF $1.05 gross, 85¢ net—over 50 MCF 95¢ gross, 75¢ net per M.

MISSISSIPPI

Hattiesburg: Trac. Co. reports second increase effective Sept. 1, 1920. Dom. $2.10 gross, $2.00 net per MCF. Ind. $15.00 per year per 100 c. f. demand plus 1st 25 MCF $1.25, over 25 MCF 90¢ per M plus S. Chge. $1.00 per meter per month. First increase effective Aug. 1, 1919. Dom. $1.80 gross, $1.70 net per MCF. Ind. same as above. Old rate: Dom. $1.50 gross, $1.40 net per MCF. Ind. same as above.

Meridian: Light & Ry. Co. reports increase effective Oct. 1, 1920. New rate: Dom. Customer Chge. 75¢ per meter per month—Meter Chge. for gas per MCF $1.80 plus 10%. Ind. Customer Chge. 75¢ per meter per month. Demand Chge. $3.00 per month plus meter charge for gas 1st 10 MCF $1.50—next 15 MCF $1.25—over 25 MCF $1.00 per M plus 10% each step—disc. both rates 10% 10 days. Old rate: Dom. 1st 3 MCF $1.80—over 3 MCF $1.50—disc. 10% 10 days. Ind. Customer Chge. $1.00 per month. Consumption Chge. 1st 25 MCF $1.00—over 25 MCF 70¢ per M—disc. 10% 10 days. New rate installed by Federal Court for trial period until March term, 1921, at which time case may be reopened by Company or City.

Vicksburg: United Gas Improvement Co. reports increase effective Nov. 1, 1920: 1st MCF $1.80 net—next 2 MCF $1.75—next 2 MCF $1.70—next 2 MCF $1.65—over 7 MCF $1.60 net per M. M. M. Chge. 50¢ per meter per month. Old rate: 30¢ per MCF less each step.

MISSOURI

Excelsior Springs: Water Gas & Elec. Co. reports increase effective Oct. 1, 1920. Old rate: $1.25 net per MCF. First increase Aug., 1918, from $1.25 to $1.50 net per M. Second increase from $1.50 to $1.75 net per MCF. City Council and Chamber of Commerce in joint meeting approved and requested P. S. C. to grant increase.

Hannibal: Citizens Gas Co. reports increase effective Dec. 15, 1920. New rate: 1st 5 MCF $1.85—next 5 MCF $1.65—over 10 MCF $1.45 per M—disc. 10¢ per M 10 days. M. M. Chge. 60¢ per meter per month. Rate granted temporary to Jan. 15, 1922. Old rate: 45¢ less per MCF each step.

Kirksville: Gas, Ht. & Elec. Co. reports increase effective Aug. 1, 1920. New rate: $2.10 per MCF—penalty 5¢ per M 10 days. Old rate: $1.70 gross, $1.60 net per MCF.

Springfield: G. & E. Co. reports increase effective Oct. 1, 1920. New rate: 1st 3 MCF $1.70—next 5 MCF $1.60—next 10 MCF $1.45—next 15 MCF $1.35—over 33 MCF $1.30 per M. S. Chge. 50¢ per meter per month. M. M. Chge. $1.00. Old rate same steps $1.35, $1.25, $1.20, $1.10, $1.00. M. M. Chge. 50¢.

MONTANA

Butte: Power Co. reports increase effective Dec. 1, 1920. New rate: 1st 4 MCF $2.20—next 16 MCF $1.95—over 20 MCF $1.70 per M—disc. 10¢ per M 10 days. M. M. Chge. $1.25. Old rate: 1st 25 MCF $1.65—next 15 MCF $1.50—next 15 MCF $1.35—next 15 MCF $1.20—over 70 MCF $1.00 per M—disc. 10¢ per M 10 days. M. M. Chge. $1.00.

Helena: Light & Ry. Co. reports increase effective July 1, 1920. New rate: $2.25 gross, $2.05 net per MCF. Old rate: $2.00 gross, $1.75 net per MCF.

NEBRASKA

Nebraska City: Co. reports third increase effective Dec. 1, 1920. New rate: 1st 2 MCF $2.25—next 3 MCF $2.10—next 5 MCF $1.90—over 10 MCF $1.45 net per M. R. T. S. Chge. 50¢ per meter per month.

Ord: City Gas Co. reports increase effective Aug. 1, 1920. New rate: $2.50 net per MCF. Old rate: $2.00 gross, $1.50 net per MCF.

NEW JERSEY

Elizabeth: Co. reports second increase effective Dec. 1, 1920. New rate: 1st 100 MCF $1.40—next 100 MCF $1.20—next 100 MCF $1.15—next 200 MCF $1.10—over 500 MCF $1.05 per M. M. M. Chge. 65¢. Old rate: 25¢ per M less each step. M. M. Chge. 50¢. Rate applies also to Crawford, Metuchen, Perth Amboy and Rahway.

NEW YORK

Beacon: So. Dutchess G. & E. Co. reports increase effective Aug. 31, 1920. New rate: Dom. $2.40 per MCF—disc. 10¢ per M 10 days. M. M. Chge. 75¢. P. P. Meters $2.30 per M. Ind. 1st 100 MCF $2.00—over 100 MCF $1.70 per M—disc. 20¢ per M 10 days. M. M. Chge. $30.00. Old rate: Dom. $2.00—disc. and M. M. Chge. unchanged. Ind. $1.50 per MCF.

Catskill: Upper Hudson Elec. & Rd. Co. reports increase effective Aug. 24, 1920. New rate: 1st 3 MCF $2.70—next 7 MCF $2.65—next 20 MCF $2.60—over 30 MCF $2.50 per M—disc. 20¢ per M, D. P. M. M. Chge. 50¢ per meter per month. Old rate: 60¢ per M less each step—disc. prompt payment 10¢ per M.

Dansville: G. & E. Co. reports increase effective Nov. 1, 1920. New rate: $2.25 per MCF. Old rate: $1.95 gross, $1.85 net per MCF.

Glen Cove: Sea Cliff and Glen Cove Gas Co. reports increase effective Oct. 13, 1920. Limited to Oct. 1, 1921. New rate: max. $2.09 per MCF. S. Chge. 75¢ per meter per month. Old rate: 1st 10 MCF $1.50, next 5 MCF $1.25, next 35 MCF $1.00, over 50 MCF 90¢ per M. The consents under which this company operated contained a provision that it shall not charge more than $1.50 per MCF. The P. S. C. (2 D.), N. Y., used the following language: "This Commission may fix a maximum rate to be charged for commercial lighting above the rate limited by a local franchise (citing South Glens Falls v. P. S. C., 225 N. Y., 216). A company giving a wholly inadequate service* should not be granted an increase in rates until such service is improved. Under the circumstances of the case under consideration 8% was held sufficient for a return upon capital, including allowance for sulplus and contingencies. A "Service" Charge is fairer and to be preferred to a "minimum" Charge."

*Under a former application for increase certain changes in service were suggested.

Hudson: Albany So. Ry. Co. reports increase by adding S. Chge. effective Sept. 10, 1920. Old and New rate: $1.50 per MCF. S. Chge. 75¢ per meter per month. Protest pending.

Oneida: Co. reports increase effective Jan. 1, 1921. New rate: 1st CCF 75¢—next 9 CCF 22½¢ per C—next 4 MCF 20¢—next 5 MCF 17½¢—next 40 MCF 15¢—over 50 MCF 12½¢ per CCF—disc. 1¢ per CCF 10 days. M. M. Chge. $1.00 per meter.

Saugerties: Gas Light Co. reports increase effective Nov. 1, 1920. New rate: 1st 3 MCF $2.10—next 2 MCF $1.90—next 5 MCF $1.80—over 10 MCF $1.60—disc. 10¢ per M 10 days. M. M. Chge. 50¢. Old rate: 20¢ per MCF each step.

Westchester: Bronx G. & E. Co. obtained a temporary injunction Aug. 1, 1919, permitting charge of $1.50 per MCF, an increase of 50¢ per M over old rate. Case still pending. Rate has remained in force to date.

NEW MEXICO

Albuquerque: G. & E. Co. reports increase effective Sept. 1, 1919. New rate: 1st 3 MCF $2.00—over 3 MCF $1.75 per M M. M. Chge. $1.00 per month. Old rate: $1.50 per MCF. M. M. Chge. $1.00 per month.

NORTH DAKOTA

Bismarck: Gas Co. reports increase effective Sept. 1, 1920. A Surcharge of 25% is added to the following rate: 1st 10 MCF $2.45—next 10 MCF $2.20—next 10 MCF $2.00—next 20 MCF $1.80—next 20 MCF $1.60—over 70 MCF $1.50 per M—disc. 20¢ per M 10 days.

OHIO

Archbold: Archbold & Stryker Gas Co. reports increase effective Nov. 1, 1920. New rate: 1st 5 MCF $2.70—next 5 MCF $2.45—over 10 MCF $2.20 per M—disc. 10¢ per M 10 days. M. M. Chge. 75¢ per month. Rates are based on cost of coal and advances or declines automatically with the cost of coal.

Bryan: For rate see Napoleon.

Delta: For rate see Archbold.

Montpelier: For rate see Napoleon.

Napoleon: Ohio Gas Lt. & Coke Co. reports increase effective Nov. 1, 1920. New rate: 1st 5 MCF $2.90—next 5 MCF $2.65—over 10 MCF $2.40 per M—disc. 10¢ per M 10 days. Rates are based on cost of coal and advances or declines automatically with the cost of coal.

Stryker: For rate see Archbold.

Wauseon: For rate see Archbold.

PENNSYLVANIA

Allentown: Co. reports fourth increase effective Dec. 1, 1920. New rate: 1st 10 MCF $1.30—next 40 MCF $1.10—over 50 MCF $1.00 per M—disc. 10¢ per M 10 days. S. Chge. 3 & 5 lt. meters 50¢—5a, 10, 20 or 30 lt. 75¢—45, 10a, 60 or 80 lt. $1.00—100 lt. or over $1.25 per meter per month. Hellertown District: Same rate for gas as Allentown with S. Chge. 25¢ higher each step.

Bethlehem: For rates see Allentown.

Boyerstown: Gas & Fuel Co. reports Old rate $1.50 net per MCF. New rate effective May 1, 1920: 1st 50 MCF $2.25—over 50 MCF $1.60 net per MCF.

Bristol: East Pa. G. & E. Co. reports increase effective Oct. 1, 1920. New rate: $2.00 net per MCF. M. M. Chge. $1.00. R. T. S. Chge. 35¢ per meter per month. Old rate: $1.50 per MCF—disc. 10¢ per M 10 days. R. T. S. Chge. 35¢ per meter.

Carbondale: Gas Co. reports increase effective Sept. 1, 1920. New rate: 1st 2 MCF $1.90—next 3 MCF $1.80—next 5 MCF $1.70—next 5 MCF $1.60—over 15 MCF $1.50 per M—disc. 10¢ per M 10 days. Old rate: 30¢ less per MCF each step.

Catasauqua: For rates see Allentown.

Hamburg: G. & E. Co. reports increase effective Sept. 1, 1920. New rate: 1st 5 MCF $2.00—next 5 MCF $1.90—next 5 MCF $1.80—over 15 MCF $1.70 per M. S. Chge. 3 lt. 60¢—5 lt. 75¢—10 lt. $1.00—20 lt. $2.00 per meter per month. Old rate: 50¢ per MCF less each step.

Hanover: Conewago Gas Co. reports increase by adding S. Chge. effective May 1, 1920. Old and New base rate: $1.80 per MCF with disc. 10¢ per M each step 15 days, making net rate: 1st 5 MCF $1.70—next 10 MCF $1.60—next 15 MCF $1.50—next 20 MCF $1.40—next 30 MCF $1.30— next 25 MCF $1.20—next 50 MCF $1.10—next 150 MCF $1.05—over 300 MCF $1.00 per M plus S. Chge. 3 or 5 lt. 50¢, 10, 20 or 30 lt. 75¢, 45 or 60 lt. $1.00, 100 lt. $1.25 per meter per month. Protest S. Chge. pending.

Honesdale: Consolidated Lt., Ht. & Pr. Co. reports Old rate: Dom. 1st 2 MCF $2.15—next MCF $2.00—next 2 MCF $1.75—over 5 MCF $1.50. Comb. 1st 3 MCF $1.75—next 5 MCF $1.25—over 10 MCF $1.00. Ind. 1st 3 MCF $1.50—next 2 MCF $1.25—over 5 MCF $1.00 per M. New rate effective Oct. 1, 1920: Dom. $2.15 per MCF. Ind. $2.00 per MCF. Penalty 5% 10 days.

Kennett: Gas Co. reports increase effective Nov. 20, 1920. New rate: $2.00 per MCF. S. Chge. 75¢. Old rate: 50¢ less per MCF. S. Chge. unchanged. S. Chge. in force since 1917.

Mauch Chunk: Gas Co. reports increase effective Oct. 1, 1920. New rate: $2.00 per MCF—disc. 20¢ to 30¢ per M prompt pay. M. M. Chge. 60¢. Old rate: $1.70 per MCF—same disc. R. T. S. Chge. 30¢ per meter per month.

Nanticoke: Luzerne Co. G. & E. Co., reports increase effective June 12, 1920. New rate: 1st 10 MCF 22½¢ per CCF—next 10 MCF 21½¢—next 10 MCF 20½¢—next 10 MCF 19½¢—next 60 MCF 18½¢—next 100 MCF 18¢—over 200 MCF 17½¢ per CCF—disc. 1¢ per CCF. R. T. S. Chge. 75¢ per meter per month. Old rates: 15¢ per M less.

Oxford: Gas & Fuel Co. reports increase effective Jan. 5, 1921. New rate: 1st 3 MCF $2.00—next 7 MCF $1.75—over 10 MCF $1.50 per M. R. T. S. Chge. 50¢ per meter per month. Old rate: 25¢ less per MCF. R. T. S. Chge. the same.

Pen Argyl: Gas Co. reports increase effective May 1, 1920. New rate: 1st 5 MCF $2.00—next 5 MCF $1.80—over 10 MCF $1.60 net per M. S. Chge. 25¢ per meter per month. Old rate: 1st 2 MCF $1.80—next 3 MCF $1.60—next 5 MCF $1.50—over 10 MCF $1.40 net per M.

Reading: Co. reports third increase effective Jan. 1, 1921. New rate: $1.25 per MCF—disc. 10¢ per M 10 days. For S. Chge. see Allentown.

Shamokin: Penna. Power & Lt. Co. reports increase effective Mar. 1, 1918. New rate: 1st 8 MCF $1.10—over 8 MCF $1.00 per M plus S. Chge. 50¢ per meter per month. M. M. Chge. 50¢. Old rate same omitting 50¢ S. Chge., and M. M. Chge. 25¢ instead of 50¢.

Tamaqua: Eastern Penna. Lt., Ht. & Pr. Co. reports second increase effective Dec. 6, 1920. New rate: $2.00 net per MCF plus S. Chge. 75¢ per meter per month. First increase Oct. 1, 1918, from $1.50 to $2.00 net per M. M. M. Chge. $1.00.

RHODE ISLAND

Westerly: Lt. & Power Co. reports Old rate: $1.50 per MCF—disc. 10-20-30% to $1.05 net. New rate effective Dec. 1, 1920: $1.35 net per MCF to which was added Oct. 1, 1920, the following Coal and Oil Clause:

Coal and Oil Clause: This rate is based upon a cost to the company of $6.50 per net ton for anthracite coal and 6½¢ per gallon for oil delivered to its gas plant. It is agreed that for every 20¢ increase or decrease in the cost of coal above or below $6.50 per net ton there shall be an increase or decrease of 1¢ per thousand cubic feet in the price of gas and for every increase or decrease of 1¢ in the cost of oil above or below 6½¢ per gallon there shall be an increase or decrease of 3½¢ per thousand cubic feet in the price of gas. Any such increase or decrease shall be made for periods of six months each and the cost of coal and oil to be used in determining such increase or decrease for such period shall be the true average cost for the six months period next preceding.

SOUTH CAROLINA

Anderson: Gas & Utilities Co. reports old rate: 1st 10 MCF $1.95—next 10 MCF $1.85—next 10 MCF $1.75—over 30 MCF $1.65 per M—disc. 10¢ per M. M. M. Chge. 75¢. First increase effective Aug. 1, 1920: 1st 5 MCF $2.50—next 5 MCF $2.30—over 10 MCF $2.10 per M—disc. 10¢ per M. Second increase effective Sept. 9, 1920: 1st MCF $2.95—next MCF $2.90—next MCF $2.85—next MCF $2.80—next MCF $2.75—next MCF $2.70—next MCF $2.60—next MCF $2.50—next MCF $2.40—next MCF $2.30—next 10 MCF $2.20—next 10 MCF $2.10—next 10 MCF $2.00—next 10 MCF $1.90—next 10 MCF $1.80—over 60 MCF $1.70. Prices net, 10¢ per M Rebilling Chge.

Charleston: Co. reports third increase effective Nov. 1, 1920. New rate: $1.55 net per MCF. M. M. Chge. 50¢ per meter per month.

Sumter: Gas & Power Co. reports increase effective Dec. 1, 1920. New rate: $2.00 gross, $1.90 net per MCF. Old rate: 25¢ less per MCF.

TENNESSEE

Nashville: Co. reports second increase effective Dec. 1, 1920. New rate: $1.90 per MCF—disc. 10¢ per M 10 days. S. Chge. 50¢ per meter per month plus a M. M. Chge. including the Service Chge. of $1.00 per meter per month.

This company was the first gas company in Tennessee to receive a rate increase which was granted July 1, 1919, pending an appraisal of its property: the appraisal resulted in a fixed valuation of the property of $2,650,000 and allowing a minimum rate of return of 6½% and a maximum rate of return of 7½% upon the above valuation from the time the emergency rate was granted, July 1, 1919, up to December 1, 1920. The company then showed it lacked $118,000 of returning 6½% on above valuation. The P. U. C. ruled "We are further of the opinion and find that the company should be allowed to amortize its losses since July 1, 1919, amounting to $118,000 and that a period of ten years be fixed during which said amortization should take place." The order states: "It is further ordered that the company may amortize its loss of $118,000 since July 1, 1919, by crediting this account with $1,000 per month, provided said $1,000 per month be earned over and above 6½% of per annum on their investment."

TEXAS

Brenham: Compress Oil Mfg. Co. reports increase from $1.50 net to $2.50 net per MCF. Co. about to close down when citizens voted increase to keep plant running. After an effort to purchase the citizens persuaded the above Co. to purchase plant.

Houston: Gas & Fuel Co. reports increase effective Sept. 1, 1919. New rate: $1.19 gross, $1.09 net per MCF. Old rate: $1.10 gross, $1.00 net.

San Angelo: Gas Co. reports second increase effective Oct. 1, 1920. New rate: $2.50 net per MCF. M. M. Chge. $2.00. Old rate: $1.50 per MCF. M. M. Chge. 50¢. First increase effective Mar. 1, 1919, to $2.00 net per MCF. M. M. Chge. $1.00.

San Antonio: Public Service Co. reports increase effective Oct. 1, 1920. New rate: 1st 10 MCF $1.35—next 20 MCF $1.25—next 20 MCF $1.10—over 50 MCF $1.00 per M—disc. 10%. Old rate: 1st 10 MCF $1.25—next 10 MCF $1.15—next 20 MCF $1.05—over 50 MCF 95¢ per M—disc. 10%.

Temple: Gas Lt. Co. reports increase Oct. 1, 1920. New rate: $1.80 gross, $1.70 net per M. M. M. Chge. $1.00. Old rate: 1st 10 MCF $1.35—next 15 MCF $1.00—next 25 MCF 90¢—over 50 MCF 80¢ per M. M. M. Chge. 50¢.

Tyler: Gas Co. reports increase effective Dec. 1, 1920. New rate: $3.00 gross, $2.85 net per MCF. Old rate: $1.65 gross, $1.50 net per MCF. City Commission examined Company's statement covering nine months and granted rate sufficient to earn 10% on appraised valuation of $92,000 physical assets. Co. in hands of Receiver since June 21, 1917. Bond holders now planning to refinance Co.

UTAH

Salt Lake City: Co. reports fourth increase effective Nov. 26, 1920. New rate: 1st 2 MCF $1.62—next 20 MCF $1.52—over 22 MCF $1.42 per M—disc. 10¢ per M 10 days. R. T. S. Chge. 25¢ per meter per month.

VIRGINIA

Petersburg: Gas Co. reports increase effective Feb. 13, 1920. New rate: 1st 5 MCF $1.70—next 5 MCF $1.60—next 10 MCF $1.50—next 30 MCF $1.40—next 50 MCF $1.30—over 100 MCF $1.20 per M—disc. 10¢ per M. M. M. Chge. 75¢. Rates in effect pending P. S. C. investigation.

VERMONT

Barre: Gas Co. reports Old rate: 1st 5 MCF $2.00—next 15 MCF $1.75—over 20 MCF $1.50 per M. M. M. Chge. 50¢. Comm. 1st 10 MCF $1.60—over 10 MCF $1.50—M. M. Chge. 50¢. Ind. 1st 10 MCF $2.00—over 10 MCF $1.50. New rate effective July 1, 1920: Dom. 1st 5 MCF $2.50—next 15 MCF $2.25—over 20 MCF $2.00 per M—M. M. Chge. 50¢. Comm. 1st MCF $2.50—over 1 MCF $2.25—M. M. Chge. 50¢—Ind. 1st 10 MCF $2.25—over 10 MCF $2.00 per M.

Montpelier: Capital City Gas Co. reports increase effective May 1, 1920, when a Service Chge. of 50¢ per meter per month was added to the following rate established in 1903: 1st 3 MCF $1.60—next 2 MCF $1.50—next 5 MCF $1.45—next 10 MCF $1.35—next 10 MCF $1.30—next 20 MCF $1.20—next 25 MCF $1.10—over 75 MCF $1.00—net prices per M 10 days. M. M. Chge. 50¢ abandoned in new rate.

Springfield: Gas Co. reports increase effective Sept. 1, 1920. New rate: 1st 10 MCF $3.25 per M, disc. 25¢ per M 15 days—over 10 MCF $2.75 net per M. Charge $6.00 payable $3.00 semi-annually in advance. Old rate: 50¢ less per MCF—charge $3.00 per year in advance.

WASHINGTON

Clarkston: Pacific Power & Light Co. reports increase effective Sept. 23, 1920. New rate: 1 CCF $1.70—2 CCF $1.80—3 CCF $1.90—4 CCF $2.00—5 CCF $2.10—6 CCF $2.20—7 CCF $2.30—8 CCF $2.40—9 CCF $2.50—1 MCF $2.60—next MCF $2.45—next MCF $2.30—next MCF $2.15—next MCF $2.00—next 5 MCF $1.60—over 10 MCF $1.10 per M—disc. 10¢ per 1st 9 rates, 10¢ per M rest of rates 10 days. M. M. Chge. $1.75 per month or fraction thereof. P. P. Meters $2.50 per M.

Port Towsend: Wash. Coast Utilities reports increase effective Dec. 1, 1919: 9 CCF from $1.25 net to $2.40—1st MCF $2.50—next 2 MCF $2.25—next 3 MCF $2.00—next 4 MCF $1.75—next 5 MCF $1.50—over 15 MCF $1.00 per M. Old rate: 25¢ less per MCF.

Walla Walla: Co. reports second increase effective Sept. 15, 1920. New rate: 1 CCF $1.70—2 CCF $1.80—3 CCF $1.90—4 CCF $2.00—5 CCF $2.10—6 CCF $2.20—7 CCF $2.30—8 CCF $2.40—9 CCF $2.50—disc. 10¢ each step 10 days—1 MCF $2.60—next MCF $2.35—next MCF $2.20—next MCF $2.10—next MCF $1.85—next 5 MCF $1.35—over 10 MCF $1.10 per M—disc. 10¢ per M 10 days.

Yakima: Co. reports second increase effective Oct. 1, 1920. New rate: 1 CCF $1.20—2 CCF $1.30— 3 CCF $1.40—4 CCF $1.50—5 CCF $1.60—6 CCF $1.70—7 CCF $1.80—8 CCF $1.90—9 CCF $2.00—disc. 10¢ each step 10 days—1st MCF $2.10—next MCF $2.05—next MCF $1.95—next MCF $1.85—next MCF $1.70—next 5 MCF $1.55—over 10 MCF $1.05 per M—disc. 10¢ per M 10 days.

WISCONSIN

Antigo: City Gas Co. reports increase effective July 1, 1920. New rate: 1st 2 MCF $2.45—next 3 MCF $2.25—next 10 MCF $2.10—over 15 MCF $2.00 per M—disc. 10¢ per M. M. M. Chge. 50¢. Old rate: 1st 2 MCF $2.00—next 3 MCF $1.75—next 10 MCF $1.60—over 15 MCF $1.50 per M—disc. and M. M. Chge. same.

Platteville: Gas Co. reports increase effective Aug. 1, 1920. New rate: 1st 2 MCF $2.50 net per M—next 3 MCF $2.20—next 5 MCF $2.00—over 10 MCF $1.90 per M—disc. through last steps 10¢ per M 10 days. M. M. Chge. 75¢. Old rate: 1st 2 MCF $2.00—next 3 MCF $1.80—next 5 MCF $1.60—next 10 MCF $1.40—over 20 MCF $1.20 per M—disc. 10¢ per M 10 days. M. M. Chge. $1.00.

Superior: Water, Lt. & Power Co. reports no increase in rates, but a reduction in Calorific Standard effective Sept. 1, 1920, from 600 to 560 B. t. u.

CANADA

Toronto: Gas Co. reports increase effective Dec. 9, 1920. New rate $1.35 per MCF—disc. 10¢ per M prompt pay. Old rate: $1.10 gross, $1.00 net per MCF.

(*Continued from page 119*)

VALVES (Needle Valves for Gas Stoves)

Acme Brass Works, Detroit, Mich.
Peninsular Brass Works, Detroit, Mich.
The Roberts Brass Mfg. Co., Detroit, Mich.

VARNISHES (Insulating and Compounds)

The Sherwin-Williams Co., Cleveland, O., New York, N. Y.

WATER HEATERS

A-B Stove Co., Battle Creek, Mich.
American Heater Corporation, St. Louis, Mo.
Bartlett & Co., Inc., Philadelphia, Pa.
Geo. M. Clark & Co. Div., Chicago, Ill.
Abram Cox Stove Co., Philadelphia, Pa.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Eclipse Gas Stove Co., Rockford, Ill.
Estate Stove Co., Hamilton, Ohio
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Humphrey Co. Div., Kalamazoo, Mich.
Kidde & Co., 169 Chambers St., New York, N. Y.
Lawson Mfg. Co., Pittsburgh, Pa.
The Kompak Company, New Brunswick, N. J.
New Process Stove Co. Div., Cleveland, Ohio.
Peninsular Stove Co., Detroit, Mich.
Philadelphia Stove Co., Philadelphia, Pa.
Pittsburgh Water Heater Co., Pittsburgh, Pa.
The Trenkamp Stove & Mfg. Co., Cleveland, O.
Rathbone, Sard & Co., Albany, N. Y.
Reliable Stove Co. Div., Cleveland, Ohio
Ruud Mfg. Co., Pittsburgh, Pa.
The Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
The Bryant Heater & Mfg. Co., Cleveland, Ohio
The Cleveland Heater Co., Cleveland, Ohio
The Hoffman Heater Co., Lorain, Ohio
The Lovekin Water Heater Co., 39 Laurel St., Philadelphia, Pa.
The Michigan Stove Co., Detroit, Mich.
Toombs Mfg. Co., Geneva, Ill.

WATER SOFTENERS

The Refinite Co., Inc., Omaha, Neb.

WATER STILLS (Gas Heated)

The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
Young Bros. Co., Detroit, Mich.

WELDED STEEL PIPE

The Bartlett Hayward Co., Baltimore, Md.
The Western Gas Construction Co., Fort Wayne, Ind.
Steere Engineering Co., Detroit, Mich.

WOOD PRESERVATIVES

The Sherwin-Williams Co., Cleveland, O., New York, N. Y.

Employment Bureau

SERVICES REQUIRED

WANTED—A syndicate operating a number of small coal and water gas plants requires an assistant in the Engineering Department. Must be an accurate and rapid draftsman with some experience in plant construction and operation. Unusual opportunity for training and experience with good future. In reply state fully experience, qualifications and salary desired, in order for application to receive attention. Address—A. G. A.

Key No. 11

WANTED—Sales Representative for Southeastern and South Atlantic States for a gas appliance line that has possibilities in that territory. Experienced gas appliance salesman preferred. Give all possible information in reply. Reply care of A. G. A.

Key No. 12

WANTED—Foreman for Carburetted Water Gas Plant in a city of 100,000 population. U. G. I. sets. Opportunity for advancement. Apply stating experience and wages expected. Address A. G. A.

Key No. 13

WANTED—Man with sufficient experience to act as Foreman of Gas Department. Forty-five miles medium high pressure system; 2,600 service connections. Should have experience on meters, and house governor repairs, also water heater and range installation work. Give full particulars in first communication as to experience, salary desired, age, married or single, and former employers. Location New England. Address A. G. A.

Key No. 14

MECHANICAL ENGINEER—On operation, maintenance and efficiency of distribution system for gas company located in Western Pennsylvania. Requires men from 24 to 35 years of age, with qualifications to become an executive. Some experience on gas distribution and manufacturing desirable. Reply stating experience and salary expected and when available. Address A. G. A.

Key No. 15

SERVICES OFFERED

WANTED—Position as Manager or Assistant in medium size town. Has had 15 years experience in coal and water gas and electric operation. Technical graduate. Any location. Address—American Gas Association.

Key No. 109

WANTED—Position as Industrial Power and Fuel Engineer. Technical engineer and salesman of excellent qualifications for industrial power and fuel sales. Now employed $3000. Address—A. G. A.

Key No. 111

WANTED—Position as Superintendent of a Coal and Water Gas Plant having a practical experience in the manufacture of same. Age 44 years and married. Salary $250 per month. A-1 references, can take up duties at once. Address A. G. A.

Key No. 112

WANTED—Position as executive in a local office of a gas or a combination gas and electric company. Have had practical experience in all branches of commercial utility work. Have been successful in dealing with the public and promoting good will of utility companies. Educated in commercial and accounting methods as compiled by the N. C. G. A. and N. E. L. A. Well acquainted in office routine and very exact on details and execution of same. Address A. G. A.

Key No. 114

WANTED—A position with a gas appliance company having need for an all around man experienced in development and selling. Can furnish best of references. Address—A. G. A.

Key No. 116

POSITION WANTED—As General Superintendent or Engineer of good-sized company, by well known technical graduate of 18 years connection with the gas business. Experienced in every branch of the industry and has made good. Has been superintendent of one large company and manager of other smaller ones. Has himself laid mains, made gas, set ranges, purchased and sold appliances, etc., so that he knows the difficulties and the things to avoid. Noted for his ability to handle men. Well read and up-to-date in every particular. Address—A. G. A.

Key No. 117

WANTED—Position as manager in medium size town or as gas engineer by technical man with 9 years experience in all branches. Both syndicate and private operation. Has shown exceptionally good results. Address A. G. A.

Key No. 118

WANTED—Position as manager or superintendent with gas company in North Eastern States. Eight years experience in both coal and water gas. Married. Good references. Address A. G. A.

Key No. 119

WANTED—Position as General Manager of Gas or Gas and Electric Company in city of size or as assistant to chief executive in very large company. Operation, management, finance, rates and capitalization by Public Utility engineer of my broad experience. Address A. G. A.

Key No. 120.

WANTED—Position as assistant to engineer of small syndicate of gas and electric companies. Have had four years experience in engineering department of a holding corporation. Address A. G. A.

Key No. 121

WANTED—Position where nearly twenty years intensive study of carbonization, works operation, by-product recovery, and all details of apparatus and machinery peculiar to the manufacturing end of the business can be utilized to mutual advantage. Address A. G. A.

Key No. 122

AMERICAN GAS ASSOCIATION, INC.

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